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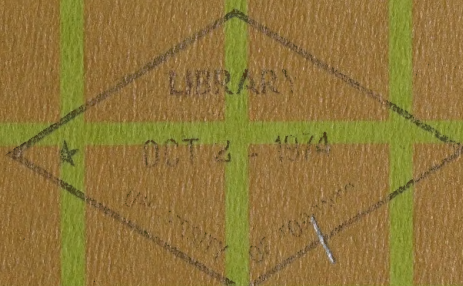
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Revised Edition

Instructors' Handbook




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Instructors' Handbook

TECHNIQUES . TESTS . TERMS

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This handbook has been designed to assist those responsible for the development of instructional staff and to provide a practical reference for instructors and others concerned with industrial training.

PREPARED BY
MANPOWER TRAINING BRANCH
APRIL, 1974.

JAMES A. C. AULD, MINISTER
J. GORDON PARR, DEPUTY MINISTER

MINISTRY OF COLLEGES AND UNIVERSITIES

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Acknowledgment

The Manpower Training Branch gratefully acknowledges its debt to the Canadian Armed Forces and to the United States Department of the Air Force for some of the material contained in this handbook.

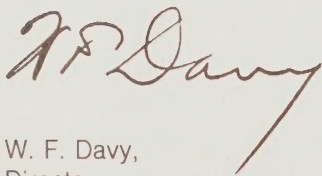
Foreword

Several years ago the Manpower Training Branch produced a handbook designed to provide training officers with organizational material for a three-day seminar on instructional techniques and to provide newly appointed instructors with a reference publication of practical use to them.

The response was immediate and gratifying. Our modest initial stock was soon depleted and continuing demands necessitated several printings. Lately we have been encouraged to make the handbook more generally available.

This edition is essentially the same as its predecessors. The emphasis remains on instructional techniques and some attention is given to tests. A limited glossary of manpower training terms is included.

The success of any training program depends ultimately on the quality of the instruction given in the field, the shop, the laboratory and the classroom. We take some satisfaction in knowing that this handbook is serving its purpose in helping to develop effective instructors.

A handwritten signature in dark ink, reading "W. F. Davy". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

W. F. Davy,
Director,
Manpower Training Branch.

1

Tips for organizing the seminar

101/ *Timetable*

1. A suggested timetable for a three-day instructional technique seminar is detailed in Annex A. If there are more than six participants, more time will naturally be required to complete *this very basic program*.

102/ *Seating arrangement*

1. It is recommended that the chairs and tables be arranged in a U-shape or semi-circle to encourage an easier exchange among participants.

103/ *Mutual introductions*

1. If the participants have not been provided with lapel identification cards, they could be instructed to print their names on place cards and insert them in holders provided.
2. It is important that introductions are made early and that more than just names are exchanged. Each participant is asked to tell the others something about himself in five minutes or less. He should cover the following minimum points:
 - a. name;
 - b. where from;
 - c. current appointment;
 - d. job history (in brief detail);
 - e. instructional role now has, will have or hopes to have;
 - f. hobbies or interests.
3. The participants are given a few minutes to organize their thoughts, then each is given the opportunity to *stand up* and speak.
4. "Mutual Introductions" is an "ice-breaking" period and is a profitable experience for all concerned.

*Suggested timetable
Instructional technique seminar*

6

ANNEX A
CHAPTER 1

PERIOD	DAY I	DAY II	DAY III
9:00 AM to 9:50 AM	COURSE OUTLINE MUTUAL INTRODUCTIONS	#1 PARTICIPANT	#5 PARTICIPANT
10:00 AM to 10:50 AM	LESSON OBJECTIVES AND COURSE PLANNING	INTRODUCTION TO OTHER METHODS OF PRESENTATION	FILM TACTICS
11:00 AM to 11:50 AM	PREPARING A LESSON	#2 PARTICIPANT	#6 PARTICIPANT
		LUNCH	
1:00 PM to 1:50 PM	USING THE CHALKBOARD AND OTHER AIDS	#3 PARTICIPANT	ORAL QUESTIONING STUDY HINTS
2:00 PM to 2:50 PM	DEMONSTRATION METHOD	STUDENT DIFFERENCES	PRINCIPLES OF LEARNING
3:00 PM to 3:50 PM	GETTING STUDENTS TO CONCENTRATE	#4 PARTICIPANT	CRITIQUE
EVENING 6:00 PM to 10:00 PM	PREPARATION FOR 30-MINUTE PRESENTATIONS	PREPARATION FOR 30-MINUTE PRESENTATIONS	

2

Training objectives

201/ *Originators*

Part of the waste that occurs in training is directly due to the fact that objectives, even if valid, have not been stated in sufficiently clear terms to permit the development of effective courses of instruction, nor have they been prepared by the right people. Course objectives should be written by those responsible for job-performance *standards* – and both the standards and objectives must be based firmly on needs, usually discovered best through an objective analysis of jobs, tasks, or functions. *Instructors themselves can certainly prepare the precise objectives for each lesson*, but the series of major objectives which provide the firm guidelines for a course of instruction should be prepared by those who control standards.

202/ *Quality*

Concerning quality in the preparation of objectives, one has, for example, seen statements of objectives which were worded, “to provide the trainees with a general knowledge of. . . .” Statements such as these are open to a number of different interpretations. Consequently, they neither provide sufficient direction for the trainer, nor help in the construction of valid measuring instruments. If effective training is to be provided, objectives must describe clearly what the man must be *able to do*, the *conditions* under which he must be able to perform, and the *standards* of acceptable performance.

203/ *Essential properties*

1. *Clear interpretation.* A useful objective must be a clear picture of performance, which will be interpreted in the

same sense by all personnel (no matter in which institution) who plan and conduct training activities.

2. *Clear expression.* The requirement is for action-framed statements which draw a picture of the trainee doing something as a result of learning. Here are examples of vague terms in Group I and clearer expressions of instructional goals in Group II:

GROUP I

To provide a working knowledge of
 To qualify
 To know about
 To understand
 To develop an appreciation for
 To be familiar with
 To orient
 To apply
 To use

GROUP II

To calculate
 To repair
 To adjust
 To modify
 To classify
 To install
 To construct
 To locate
 To select

204/ *Characteristics of performance objectives*

1. Performance objectives have three essential characteristics:
 - a. *They identify the performance at the end of training.*
 The statement of an objective should identify exactly what the trainee is expected to do at the end of an instructional unit or completed course of instruction to demonstrate that he has achieved what is required. This may involve the application of specific knowledge or the demonstration of specific skills or a group of skills.
 - b. *They describe the conditions of performance.* The statement of a performance objective must describe

clearly and completely the conditions under which the trainee will demonstrate his proficiency. That is, the "conditions" part of an objective identifies what the man will be given in order to do the job (tools, equipment, job aids, references, materials); what he will be denied (tools, etc.); what assistance he will have, if any; what supervision will be provided; and the physical environment in which he must perform (climate, space, light, etc.).

c. *They set a standard of acceptable performance.* The statement of a performance objective should describe how well the trainee must be able to perform. The set standard establishes the minimum performance requirements for a task or element. To do this, each performance objective must describe the quality of the work product or service produced (accuracy, completeness, clarity, tolerance, etc.); the quantity of work produced (the number of work units completed); time allowed; and possibly, a combination of quality, quantity, and time standards.

205/ *Uses of performance objectives*

1. Performance objectives provide the basis for a sound training system. Some of the more important uses of performance objectives are stated below:
 - a. *To facilitate the selection of appropriate course content.* Well-stated performance objectives provide a practical and objective means of determining what must be included in a course of instruction. They take much of the guesswork out of deciding what content is pertinent and what is extraneous.
 - b. *To permit the selection of the most suitable methodology.* When an instructor sets his own course objectives, he often cannot see the "forest for the trees". He may, however, set his own *lesson* objectives.
 - c. *To establish clear-cut instructor and trainee goals.* Performance objectives permit both the instructor and the trainee to know precisely what is required of the trainee at the end of the instructional unit. This knowledge prevents gaps and unnecessary duplication in instruction, improves motivation, and makes learning more effective.
 - d. *To provide a firm basis for the development of*

performance checks. Performance objectives are essential to the establishment of valid and reliable performance checks. Good performance checks are difficult to devise under any conditions, but without well-stated performance objectives as a basis, checks are much less likely to be valid.

e. *To provide a realistic basis for the evaluation of graduates on the job.* It is impossible to obtain reliable judgments of the effectiveness of school-trained men in performing their technical tasks unless there are firm performance objectives to help provide these standards.

206/ *Steps in writing performance objectives*

1. *Identify the performance required.* Although a number of ingredients contribute to any observable action, i.e., knowledge, skills, attitudes, etc., it is important that these elements be recognized as components of the instructional situation, or prerequisites to desired performance rather than the goal itself. Performance objectives describe proficiency which becomes established either during or at the end of a sequence of instruction and which can be seen and measured. Statements of desired performance which meet this standard will provide a firm foundation for determining whether the instruction has been successful.

EXAMPLE:

"To develop an understanding of the T-202 radio transmitter". This statement is difficult to interpret because it does not picture the trainee displaying what he has learned at any point in the sequence of instruction. Rather than outlining a definite picture of a trainee doing something, it sketches a state of mind which, in some way or another, relates to a radio. In an attempt to determine the real requirement, it might be established that the trainee really must be able to "identify by name each of the controls located on the front panel of the T-282", or "must be able to trouble-shoot the T-282", or "must be able to construct the block diagram for the equipment". The latter statements are more precise in showing the behaviour that the trainee is really expected to acquire.

2. *State the conditions under which the desired performance must be demonstrated.* Conditions may include mental factors, climatic or geographic conditions, as well as tools, references, guides, etc., and the critical element of supervision or assistance allowable. Some specific examples of conditions related to performance are:

Given Tool Kit X-3 . . .

Given fluctuating temperature range of 60° – 105° . . .

With limited supervision . . .

With the aid of a table of cube roots . . .

EXAMPLE:

“The trainee must be able to calculate resistance, current, and voltage at selected points in the . . . circuit of a superheterodyne receiver”. An examination of this statement reveals that the trainee is pictured doing something with particular end-products expected, and in relation to a specific kind of circuit. However, the statement still leaves unanswered questions concerning the behaviour to be displayed. Is the trainee to perform these calculations with or without references containing formulae such as Ohm’s Law? Is Ohm’s Law the specific basis for the calculations, or is some other calculation principle involved? Will the calculations be made with test equipment on an actual circuit, or will it merely be a paper exercise? If a circuit is involved, will the conditions of the circuit be static or dynamic?

These types of questions indicate that the performance objective used must be amplified to include the specific conditions under which the performance is to be displayed. The following statement serves this purpose more effectively:

“Given a reference outlining Ohm’s Law and resistor colour codes, a voltmeter and ammeter, and 10 preadjusted receivers configured to represent variable circuit conditions, the trainee must be able to calculate resistance, current, and voltage at selected points in a superheterodyne circuit.”

3. *State the standard of acceptable performance.* The standard consists of words which describe minimum acceptable performance, sets a time limit where

appropriate, or defines quality requirements. To ensure that the standard is clearly established, the following terminology is suggested:

Within 2 minutes . . .

Without error . . .

At least 8 out of 10 . . .

To a tolerance of . . .

In accordance with procedures defined in . . .

To the standards outlined in Manual . . .

EXAMPLE:

"From memory, the trainee must be able to list and define in writing the technical characteristics of the radio receiver R-360".

Given this objective, one can ask:

What is acceptable performance?

How many technical characteristics are there?

How many must the trainee list and define?

How is the adequacy or accuracy of the definition checked?

The objective does not provide answers to these questions.

Improved statements: "From memory, the trainee must be able to list in writing, 4 of the 5 technical characteristics as set forth in pages 5 and 6 of Manual" or

"When shown a radio receiver R-360, the trainee must be able to identify from memory the name of each of the 26 operational controls with complete accuracy, and within 5 minutes. Nomenclature used must conform with standard terms contained in the operating manual".

With these statements, there is no interpretation needed to identify the exact standard required.

207/ *Format*

1. Although it is possible to write a single statement which incorporates the three essential parts of a true performance objective, it is easier to state objectives clearly by physically separating the three parts. The three parts should be written to show:

- a. *what* the trainee will be doing to demonstrate that he has attained the objective;
- b. the important *conditions* under which the trainee must demonstrate his competence; and
- c. the *standard* of performance expected of the trainee.

208/ *Checking performance objective statements*

1. Draft performance objective statements must be subjected to a final rigid check prior to use. The items listed below are some of the more important points:
 - a. *General*
 - i Are the statements free from grammatical, spelling and typographical errors?
 - ii Is the sentence structure clear, concise, simple and straightforward?
 - iii Is the use of punctuation and abbreviations correct and uniform?
 - iv Do the statements avoid ambiguity?
 - v Is useless or confusing information excluded?
 - b. *Performance*
 - i Does the statement clearly and precisely describe what the trainee will do to demonstrate what he has learned?
 - ii Does the statement avoid the use of loaded words?
 - iii Does the statement begin with a verb?
 - c. *Conditions*
 - i Does the statement clearly and completely describe the conditions under which the trainee must demonstrate the required behaviour?
 - ii Does the statement identify what the trainee will be given to do the job (tools, equipment, job aids, material)?
 - iii Does the statement clearly identify the tools, equipment, job aids, or materials the trainee will be denied (when pertinent)?
 - iv Does the statement describe the physical environment (space, climatic conditions) in which the job must be done (when pertinent)?
 - v Does the statement describe the assistance (if any) the trainee will receive?

- vi Does it describe the amount and kind of supervision (if any) the trainee will receive during job performance?
- d. *Standard*
 - i Does the statement clearly describe how well the trainee must perform?
 - ii Is the minimum level for acceptable performance clearly defined?
 - iii Is the quality of the work products or services defined in terms of standards of accuracy, completeness, format, sequence, clarity, neatness, tolerances, or number of errors permitted?
 - iv Are time standards clearly defined in terms of duration of performance, speed of performance, or total time allowed for performance?

3

The lesson plan

301/ *Introduction*

Rarely is an impromptu lesson a successful one. Thorough advance planning will ensure a successful lesson.

302/ *Parts of a lesson plan*

1. A lesson plan is divided into four main areas. (See Annex A). These are:
 - a. *Preamble*. This area is designed for administration only. It gives direction and is not used while in the classroom.
 - b. *Introduction*. This area introduces the presentation and contains four divisions, namely: aim, motivation, outline, and link (AMOL). These four points may appear in any order. A well-planned introduction establishes rapport. The *aim* gives the class the “target” for the period; the *motivation* gives the class the “why” the material must be learned and develops class interest; the outline tells the group “how you will reach your target” or the route you will take to cover the topic; the *link* lets the class know “where and how the material fits” with past experience or future instruction. Thus, the class has a complete understanding of the overall picture before the body of the lesson is commenced.
 - c. *Presentation*. This is the body of the lesson. The “must know” material is given here.
 - d. *Application*. This is the “driving home” of the lesson. Here the students answer oral or written questions. They work at problems. They perform a skill. They ask questions. Here, student activity will be determined by the nature of the lesson. Finally, the instructor summarizes the main points.
2. A suggested lesson plan format is attached as Annex B

and illustrates the type of detail which may be contained. Note that it is essentially a list of headings to guide the instructor – not a text which he reads to his students.

303/ *Using the plan*

1. After it has been drawn up, the lesson plan must be looked over before the period starts and not pigeon-holed until the minute it has to be taken into the classroom. Such a review refreshes the instructor's memory and ensures a smooth, lively presentation. Awkward pauses will thus be avoided.
2. No two teaching situations are identical. Before re-using a plan – particularly one not originally prepared by himself – a good instructor studies it carefully and is prepared to vary the material and its method of presentation according to experience gained in previous use.
3. During class the instructor must remember that the lesson plan is only a guide, and as such its purpose is to keep the pertinent material before him; it thus serves to keep him from getting away from the subject or being sidetracked. Moreover, it is neither a crutch nor a substitute for thinking. It is to be used for quick reference and not read to the class. The instructor must be able to fill in the details from memory once the plan has supplied him with the guidelines.

304/ *Advantages of planning*

1. There are many advantages to planning but the more pertinent ones are that it:
 - a. results in an orderly arrangement of material
 - b. ensures thorough coverage of the material
 - c. helps to guarantee better use of time
 - d. keeps the instructor on track
 - e. adds to an instructor's confidence

305/ *Points to note*

1. The instructor should develop his lesson plan carefully. It is a document of value to him and to others who may use it as a model.
 - a. The plan must show the time to be spent on the three stages of the lesson.

- b. The training aids and references (author, title, pages) should be listed in the appropriate sections.
- c. When drawing up the plan, the instructor must remember that students learn best when the lesson proceeds from the known to the unknown, and from the easy to the difficult.
- d. The plan need not be limited to one sheet of paper.

306/ *Conclusion*

If a lesson plan is prepared and used properly, it is of inestimable value to all concerned. However, it does not release the instructor from the obligation of knowing his background material thoroughly and presenting it clearly to the students.

Basic lesson plan

COURSE _____

INSTRUCTOR _____

TOPIC _____

LESSON OBJECTIVE _____

TRAINING AIDSREFERENCES

INTRODUCTION TIME _____

PRESENTATION TIME _____

APPLICATION TIME _____

These three sections are crowded here to allow for illustration of the required parts of a plan on one sheet.

In use they are of course spaced to suit the material under each heading.

Suggested lesson plan format

NAME _____

COURSE NO _____ DATE _____ TIME ALLOWED 40 Minutes

LESSON OBJECTIVE: To teach the important features of mobile homes, each student must:

- 1 know the size and function of the four main types of mobile homes
- 2 understand the general principles of construction
- 3 know the layout of a typical mobile home
- 4 know the advantages and disadvantages of mobile homes.

TRAINING AIDS:

Chalkboard	Pointer
Chalk	Trailer Pamphlets
Spotlight	Assistant (Briefed)
Screen	

REFERENCES:

"Consumer Report" March 69, page 113
 "Science & Mechanics" June 69, page 69

INTRODUCTION TIME 2 Minutes

Link – Origin of trailers – gypsies
 river barges
 hungry thirties.

Aim – To familiarize students with the aspects of mobile homes. ELABORATE AS PER OBJECTIVE

Outline – Types
 – Construction
 – Layout
 – Advantages
 – Disadvantages.

Motivation – Every person desires – a home - a trailer ANECDOTE

PRESENTATION:

home has many
advantagesTIME 33 Minutes1. *Types*

CHALKBOARD #1

- a. Small*
 - 15 - 22 feet
 - holiday type
- b. Medium*
 - 22 - 35 feet
 - semi-permanent .
- c. Large*
 - 38 - 60 feet
 - permanent
 - not often moved
 - 2 widths: 8 and 10 feet
- d. Two-story* - various lengths
 - permanent
 - difficult to move

QUESTIONS

What are the 2 widths of trailers?

What is the main disadvantage of the large trailer?

2. *Construction* - large trailers

- a. Frame*
 - channel steel
 - box type
 - running gear
 - four-wheel brakes
- b. Walls*
 - 2' x 4' fir
 - external: aluminum or caulked
 - internal: birch, knotty pine or limed oak
 - windows: double glass
- c. Roof*
 - aluminum - rigidized
 - joints - welded - one piece
 - coolsealed coated

C B #2

ANNEX B
CHAPTER 3

- d. Insulation* – fibre glass
– vapour barrier

QUESTIONS

How is leakage prevented?
Why is aluminum rigidized?

RECAP BY
OVERHEAD
PROJECTOR

3. *Interior Layout.*

- Bedroom (front)
- Living Room
- Kitchen Dinette
- Hallway
- Bathroom
- Bedroom (rear)

QUESTIONS

What is the interior layout of a trailer?

RECAP BY
OVERHEAD
PROJECTOR

4. *Advantages.*

- Accommodation
whenever transferred
- Fully equipped
- Investment
- Low down payment
- Easy to keep clean

C B #4

5. *Disadvantages.*

- Parks not always
available
- Space
- High interest rate
- Depreciation

QUESTIONS

What are 3 advantages of a trailer home?
What are 2 disadvantages of a trailer home?

RECAP

APPLICATION:

1. *Check up.*

- a. What 4 types of trailers are for sale today?
- b. Which of these two are not permanent homes?
- c. What type of steel is used for the construction of the frame?
- d. What material is used for an attractive interior finish?
- e. What is the best type of roof?
- f. What type of insulation is recommended?
- g. Describe the interior layout of a large trailer.

2. *Summary.*

- a. Types – permanent trailers.
- b. Construction – stress frame.
- c. Interior layout – stress the handiness.
- d. Advantages – always have a home.
- e. Disadvantages – disposal.

4

Preparing for a practice teaching lesson

401/ *Introduction*

1. This chapter outlines the steps to follow when preparing a lesson. They were devised to speed the task of preparation.

402/ *How to proceed*

1. Choose the topic (See Annex A):
 - a. technical matter should be restricted to basic principles
 - b. some topics appeal to all; e.g. hobbies, first aid, safety equipment, etc.
2. Read all available information:
 - a. training manuals
 - b. library material
3. Record all pertinent information.
4. Select suitable illustrations and demonstrations:
 - a. diagrams and charts
 - b. models
 - c. actual equipment
 - d. films
 - e. overhead projector
5. Choose the best method or combination of methods for the presentation:
 - a. demonstration
 - b. discussion
 - c. lecture
6. Write the objective on the lesson plan (the "what", the "conditions", and the standards of learning to be achieved by the students).
7. Prepare and write the presentation step, remembering to:
 - a. arrange the main headings in logical order
 - b. group the sub-headings under the appropriate main headings

- c. proceed from old to new, and easy to difficult whenever possible
- d. note optional information that may be included or omitted, depending upon the time remaining
- 8.** Prepare and write the four parts of the introduction:
 - a. aim – clear and precise
 - b. motivation – give factors
 - c. outline – main headings
 - d. link – reference to other lessons (past and future), reviews, past experience of students, etc.
- 9.** Prepare the application: “Groove in” by means of:
 - a. student practice
 - b. discussion
 - c. examination (written or oral)
 - d. a neat, final summary
- 10.** Fill in the remainder of the Lesson Plan - training aids, references, etc.
- 11.** Check the plan and rehearse the lesson. Read the “Check List” attached as Annex B and check your lesson plan.
- 12.** Check aids for the lesson.
- 13.** Review just before giving the lesson.
- 14.** Check the physical aspects of the classroom – ventilation, seating arrangement, etc.

Suggested topics for Practice teaching lessons

Listed below are sample tasks which may be used as a basis for *performance objectives* for Practice Teaching Lessons.

Most of these tasks can be covered in 30 minutes. Particular consideration must be given to the background knowledge of the class, and to the availability of training aids.

This list represents only a cross-section of tasks which are attainable in the allotted lesson time. (You may use any other one you wish. It is preferable that you choose a lesson in which you teach your students to *do* something. It must be noted, however, that the lesson should be planned to accomplish a performance objective within the allotted class time. Try to avoid a lesson which is exclusively theoretical.)

1. Write a memorandum.
2. Write a letter.
3. Complete a Will.
4. Convert temperatures from Centigrade to Fahrenheit.
5. Carry out a vehicle safety check.
6. Bandage an arm, leg, foot, hand.
7. Perform artificial respiration.
8. Splint a fractured shinbone.
9. Tie a St. John sling.
10. Bandage a broken collar bone.
11. Treat a casualty for the effects of sunburn/frostbite.
12. Treat a casualty suffering from the effects of heatstroke.
13. Treat a casualty for a snake bite/animal bite.
14. Blanket a litter using the "one blanket" method.
15. Blanket a litter using the "two blanket" method.
16. Solve binary to decimal conversions.
17. Add binary numbers.
18. Subtract binary numbers.
19. Solve mathematical problems on the slide rule (multiply or divide).
20. Solve simple linear equations.
21. Plot statistical graphs.
22. Solve simple interest problems.
23. Solve compound interest problems.
24. Find the height of a building by proportion.
25. Find the sum of an arithmetic series.

26. Find the value of the n^{th} term in an arithmetic series.
27. Calculate the mean, median and mode of a distribution of numbers.
28. Convert from decimal to binary.
29. Convert from binary to decimal.
30. Calculate the square root of a number.
31. Find least common multiple.
32. Tie a Windsor knot.
33. Connect batteries in series – parallel.
34. Calculate resistance, current, and voltage in an electrical circuit.
35. Solder two pieces of wire together.
36. Measure resistance using an Ohmmeter.
37. Wire a two-prong male wall plug.
38. Solve problems using Ohm's Law.
39. Determine the merit of electron tubes.
40. Splice a TV lead-in ribbon.
41. Tie a reef knot, clove hitch, bowline, sheet bend.
42. Tie a fisherman's bend knot.
43. Tie a crown knot.
44. Replace a defective exciter bulb in a projector.
45. Replace the projection bulb in a projector.
46. Remedy a condition caused by a broken film in a projector.
47. Splice a 16mm or 8mm film.
48. Perform pre-operation inspection of the projector.
49. Change the combination of a padlock.
50. Make measurements with a micrometer.
51. Use a tube tester.
52. Prepare a soldering iron for soldering.
53. Sharpen a chisel.
54. Sharpen a saw.
55. Set up a rabbit snare.
56. Carry out an inspection on a fire extinguisher.
57. Play the game of euchre.
58. Play the game of one-handed solitaire.
59. Compute five-pin bowling line scores.
60. Perform a basketball foul shot.
61. Demonstrate the grip and service for badminton.
62. Tie a dry fly to a line.
63. Compute bowling handicaps.
64. Complete a bowling score sheet.

65. Mix a Brandy Alexander, a Stinger, a Bloody Mary.
66. Blow a clear note on a bugle.
67. Take a set of fingerprints.
68. Test a soil sample.
69. Load a slide camera.
70. Identify musical symbols.
71. Set a spark plug.
72. Patch a tire tube.
73. Demonstrate the technique of using chopsticks.
74. Sharpen a knife using a whetstone.
75. Sharpen scissors using a whetstone.

Check list for analyzing an Instructor's lesson plan

1. *In the PREAMBLE, have you included:*
 - a. subject, length of lesson, and place?
 - b. list of tools, equipment and aids?
 - c. references?
 - d. statement of topic and lesson objectives?
 - e. other required information?
2. *Does the INTRODUCTION:*
 - a. tie this lesson in with previous lessons or previous student experiences?
 - b. provide for review where desirable?
 - c. show value of learning this material?
 - d. serve as an interest-arousing factor?
 - e. contain a clear, precise aim for the lesson which you will state to your class?
 - f. give the outline?
3. *Does the PRESENTATION provide:*
 - a. pockets of new material arranged in logical order?
 - b. development from known to unknown; from simple to complex?
 - c. for recapitulations between pockets of learning?
 - d. complete outline for demonstrations and performance, if any?
 - e. examples, illustrations, and devices for clarification of difficult areas?
 - f. integration, where possible, with other training?
 - g. directions for use of aids?
 - h. sketches for the blackboard work, if board is to be used?
 - i. key questions and desired answers?
4. *Does the APPLICATION:*
 - a. provide for student practice?
 - b. contain prearranged questions?
 - c. tie this lesson with ones to follow?
 - d. summarize important points and state conclusions reached?

5. *Is the PLAN:*

- a. screened so that all material points toward the objectives?
- b. provided with smooth and purposeful transitions?
- c. in a form that makes it usable during class?
- d. practical with regard to time-material relationships?
- e. workable and flexible?

5

Effective use of the chalkboard

501/ *Introduction*

1. Many instructors fail to recognize the chalkboard for what it is – “the visible voice”. Many instructors concentrate on their spoken presentation and are not providing the best possible instruction: they forget to use the chalkboard effectively. The chalkboard is an effective training aid which is flexible and adaptable. It can be readily used in most lessons and briefings.

502/ *Uses*

1. The flexibility of this training aid is reflected in the varied uses that an instructor can make of it during a lesson. With the chalkboard the instructor can emphasize:
 - a. lesson topic
 - b. lesson outline
 - c. explanations
 - d. drawings and diagrams
 - e. difficult and new words
 - f. definitions
 - g. directions
 - h. assignments
 - i. reviews
 - j. examinations
 - k. summary

503/ *Planning*

1. Effective use of a chalkboard begins during the preparation stage of a lesson. When the instructor has decided on the method of presentation, he should ask himself either privately before the lesson, or developmentally during the lesson:
“What will I put on the chalkboard?”

"How will I put it on?"

"Where will I place it?"

The final step in his planning should be the preparation, on paper, of the expected finished chalkboard work. (See Annex A). He attaches this layout to his lesson plan.

504/ *Writing*

There is a rule of thumb to observe when using the chalkboard:

"If you cannot write well, PRINT."

Before writing, the instructor should again ask himself:

"What?"

Aim

Outline

Main headings

Sub-headings

Brief notes

"How?"

Writing firmly and sufficiently large for all to see

Moving with the chalk

Spacing evenly

Underlining headings

Emphasizing with colour

Using appropriate size of words and diagrams

Avoid hiding material with your body or other obstructions

Avoid talking to the board.

"Where?"

Where all can see

505/ *Drawing*

1. A good instructor need not be an artist to draw effectively on the chalkboard. He need only be able to draw straight lines to produce simple drawings. These may be done before or during the lesson. Once more he should ask:

"What?"

Simple drawings and schematics

"How?"

Avoid crowding

Label horizontally

Emphasize with colour

“Where?”

Where all can see

506/ *Erasing*

1. Everyone has seen a chalkboard so cluttered with writing and casual material that what stood out in the confusion was the small space left clear. The decision, therefore, as to what should be rubbed off is second in importance only to the decision as to what should be put on. The instructor should ask himself:
“What should I rub off during the lesson?”
Anything not needed for review.

507/ *Tips*

1. Here are a few tips to the instructor who uses chalk:
 - a. Brown paper can be used as a substitute for a portable board.
 - b. Diagrams lightly pencilled on the board can quickly be chalked in.
 - c. Notes on cards on the chalk rail are a memory aid.
 - d. Pale colours – yellow, pink, white in that order – are best. Students at the back cannot clearly see dark colours.

508/ *Summary*

1. Plan carefully and always aim for:
 - a. neatness
 - b. simplicity
 - c. clarity

MOBILE HOMES – TYPES	CONSTRUCTION	INTERIOR LAYOUT / ADVANTAGES	DISADVANTAGES
SMALL – 15' – 22'	FRAME – Box Type Channel Steel	MOBILE	DISPOSAL ACCOMMODATION
MEDIUM – 22' – 35'	WALLS – External – Aluminum – Interior – Birch, Oak – Rigidized	FULLY EQUIPPED INVESTMENT	PARKING SPACE (PARKS)
LARGE – 38' – 60' (A) 8 FEET WIDE (B) 10 FEET WIDE	INSULATION – Fibre Glass – Vapour Barrier	LOW DOWN PAYMENT EASY TO KEEP CLEAN	INTERIOR SPACE HIGH INTEREST RATES
TWO STORY			

6

Training Aids

601/ *Introduction*

1. The main objective of all instruction is to help the student learn. We can accomplish this more effectively, if we consider the five physical senses as channels of learning. All knowledge flows to the brain through one or more of these senses. Because 80% is absorbed through the eyes, it is advisable to give students something to look at, e.g., training aids. (Training aids include any gadget or gimmick that will help put the point across to students.) Other terms used for training aids include:
 - a. visual aids: silent films, film strips, charts, slides
 - b. audio-visual aids: sound films
 - c. audio aids: recordings (phono, wire, tapes)
 - d. demonstration pieces: models, cut-aways, etc.

602/ *Advantages*

1. Training aids have four distinct advantages:
 - a. They clarify verbal explanations.
 - b. They convey more information in less time than talking can.
 - c. They demonstrate principles difficult to visualize.
 - d. They add realism and interest.

603/ *Types of training aids and their uses*

1. *Charts and Diagrams should be:*
 - a. kept out of sight until needed,
 - b. large enough to be easily seen from back of room,
 - c. in colour for clarity and emphasis,
 - d. removed when finished with so they do not distract.
2. *Chalkboards*
 - a. Use for headings, sub-headings, diagrams, unusual words, etc.

- b. Use systematically from left to right.
- c. Don't clutter up with non-essentials.
- d. Use pale shades.

3. *Overhead Projector*

- a. Use with prepared transparencies – 10" × 10" sheets of plastic
- b. Use developmentally during the lesson, as required
- c. Use grease pencil ("felt-writer" is more difficult to erase).

4. *Opaque Projector*

- a. Use for projecting pictures, maps, etc. on the screen.
- b. Use for enlarging and reproducing diagrams.

5. *Slide and Film Strip Projector*

Use for studying stills; some excellent new ones being developed.

6. *Films (Motion Pictures)*

Used properly, applicable professionally – produced films are among the finest training aids.

7. *Actual Material*

Use for small groups

8. *Own Models*

- a. There is no limit to what you can construct with scrap lumber, cardboard, masking tape, and a little paint.
- b. Using your imagination, initiative, and a little patience, you can make various training aids to suit your purposes.

604/ *Summary*

- 1. Use training aids; they will dress up your lesson and make your instruction much more effective. **Seeing is not only believing – it is remembering!**

7

Film tactics

701/ *Introduction*

1. No reasonable person advocates replacing teachers with films. A film presentation is a lecture, a demonstration, or a discussion in which the main training aid is the film. If we forget this, the instructor gives over his job to the film, and the film is *not* designed to be a substitute for an instructor.

702/ *Five steps*

1. To obtain full teaching value from training films, the following steps should be observed:
 - a. *Preview.* This is done possibly days in advance of the actual film period. The instructor analyzes the film content, times it, makes notes for a lesson plan, and prepares to answer any student questions.
 - b. *Preparation.* This is done anytime before the actual period. The instructor must develop a lesson plan and questions; book the theatre and film; check on classroom facilities such as seating, ventilation, blinds, screen, lighting, and prepare the film and projector.
 - c. *Introduction.* With his class before him, the instructor must introduce the film. (In actual tests it has been proven that student learning is very much increased by this step.) In doing so, he should tell them:
 - i what the film is about
 - ii why it is being shown
 - iii what to look for.
 - d. *Presentation.* The projectionist should exhibit good showmanship in presenting the film. Remember especially:
 - i *Starting*
Title is on the screen;
volume is at a minimum.

ii *Ending*

The lamp is switched off at "The End";
volume is faded out.

e. *Application*. This stage is also a "must" if students are expected to remember anything taught in the film.

Depending upon the time left in the period, the instructor should:

- i ask questions
- ii use a film guide sheet
- iii animate class discussion
- iv use a syndicate exercise
- v allow the students to practice any skill taught
- vi summarize highlights.

703/ *Discussion questions*

1. The following questions are designed to emphasize the need for thorough preparation when using training films and the means of obtaining maximum benefits from them:
 - a. What points should be considered in pre-class preparation?
 - b. Where should the instructor sit during the showing of the film?
 - c. Should an instructor comment on the film during the actual showing?
 - d. Should a period be split, e.g., should a 40-minute film be interrupted after 20 minutes for a discussion?
 - e. What is the maximum length of time films may be viewed without affecting attention and retention?
 - f. What is the likely response from students who are told that they will be tested afterwards?

704/ *Conclusion*

1. A good training film is one of the instructor's most useful aids and he should employ it to maximum advantage.

8

The demonstration-performance method

801/ *Introduction*

1. One of the best methods of teaching skills is to use the Demonstration-Performance method.

802/ *Introduction step*

1. The introduction – like the introduction to most lessons – consists of parts:
 - i Aim – the purpose of the lesson, those skills students will acquire as a result of instruction.
 - ii Motivation – why the lesson is important to students as future tradesmen.
 - iii Outline – the major areas which the instructor will cover during the demonstration.
 - iv Link – how the lesson ties in with what the students already know from experience or have been taught during the course.

803/ *Presentation step*

1. The instructor explains what he is going to do and demonstrates it. The explanation and demonstration, of course, may be combined.
2. The instructor must prepare carefully (a check list is recommended); he must ensure that every student can see what he is doing; he could encourage student participation by posing thought-provoking questions.

804/ *Application step*






1. The instructor elicits imitation by his students; he and his assistants correct students who make errors. Imitation and correction are combined in many cases. Normally, the instructor will sum up by re-emphasizing the importance of the skill taught and the correct procedures.

2. The application or performance may not always take place at the end of the lesson. A lesson may be a series of explanations, demonstrations and imitations. For example, when teaching knot-tying or papercup-making (see Annex A), the instructor may show the whole movement first, then demonstrate each part separately, and have the students imitate him after each one.



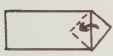

805/ *Conclusion*

1. The four fundamental steps of the Demonstration-Performance method are:
 - a. EXPLANATION
 - b. DEMONSTRATION
 - c. IMITATION
 - d. CORRECTION

The demonstration-performance method

STEPS IN THE OPERATION Step: A logical segment of the operation in which something is done to advance the work.	KEY POINTS Key point: Any directions or bits of information that help to perform the step correctly, safely, and easily.
 <p>Place 8" \times 10$\frac{1}{2}$" sheet of paper in front of you on flat surface.</p>	<p>Be sure surface is flat and free of interfering objects.</p>
 <p>Fold lower left corner up.</p>	<p>a. Line up the right hand edges. b. Make a sharp crease.</p>
 <p>Turn paper over.</p>	<p>a. Pick up lower right hand corner with right hand and place it at the top. b. Folded flap should not be underneath.</p>
 <p>Fold excess lower edge up.</p>	<p>a. Line up right hand edges. b. Fold should line up with bottom edge. c. Make sharp crease.</p>
 <p>Fold lower left corner flush with edge "A."</p>	<p>a. Keep edges "B" and "C" parallel. b. Hold bottom edge in the center with finger while making fold.</p>

ANNEX A
CHAPTER 8

	<p>Fold upper corner to point "D".</p>	<p>a. Hold cup firmly with left hand. b. Bring upper corner down with right hand.</p>
	<p>Separate lower right corner and fold back.</p>	<p>a. Hold cup with left hand. b. Fold back with right hand. c. Make sharp creases.</p>
	<p>Turn cup over and fold remaining flap back.</p>	<p>Make sharp creases.</p>
	<p>Check cup to be sure it will hold water.</p>	<p>Open cup and look inside.</p>

9

The lecture method

901/ *Introduction*

1. The lecture is the most widely used method of instruction and often the most abused.

902/ *Advantages and special uses for the lecture*

1. A lecture is extremely portable and can be delivered anywhere.
2. It can be used to present many ideas to a large group in a short time.
3. Lecturing, like speech-making, can have stronger emotional appeal than any other form of teaching. This is important, as much of our learning is accomplished through our emotions, e.g., morale-building lectures.
4. It can be effectively used to describe program content; to teach new material and illustrate theoretical concepts.
5. It can be used as a preliminary discussion and demonstration; to summarize material.

903/ *Limitations*

1. There are some obvious limitations to the lecture method:
 - a. Some instructors tend to stimulate one sense only.
 - b. The lecture can often be dull unless there is a definite effort to vitalize it.
 - c. The class is passive – the instructor does nearly all the work.
 - d. There may be little feed-back on the learning accomplished.

904/ *How to give an effective lecture*

1. The limitations of the lecture method can often be minimized and the effectiveness of the method increased if the instructor observes the following points:

- a. *Prepare well.*
 - i Know your subject thoroughly.
 - ii Rehearse but don't memorize.
 - iii Check the room and class comfort.
- b. *Gain the attention of your class*
 - i Employ the silent treatment.
 - ii Ask a rhetorical question.
 - iii Tell a story that ties in with the subject matter.
 - iv Begin with a startling remark.
 - v Use a gimmick, e.g., blow a whistle.
- c. *Hold Attention.* The instructor has three areas to consider with regard to holding the attention of the class. These are what the students *see*; what they *hear*; and what they *understand*.
 - i *What They Should See*
 - a good bearing
 - a neat appearance
 - a good attitude (enthusiasm is something you see as well as feel)
 - no distracting mannerisms
 - no classroom distractions (e.g. unnecessary training aids, charts, etc.)
 - ii *What They Hear*

The instructor's voice must be easy to listen to. The key here is to have variation in rate, pitch and volume. Quality and articulation are also important factors to be considered.
 - iii *What They Understand*

It is impossible to hold the interest of students if they can't follow what you're talking about. Keep these tips in mind:

 - a *Introduce the topic*
 - State what the lecture is about.
 - Show the importance of the lecture to group members.
 - Link the lecture with their previous experience.
 - b *Present the main material*
 - Follow a logical order.
 - Adapt material to class level.
 - Introduce variety-use of aids overcomes some of the limitations mentioned.

Use simple words.

Make important points stand out.

Summarize frequently.

c *Follow up the lecture*

Ask for questions-this helps

overcome the limitations mentioned.

Initiate a discussion.

Summarize.

905/ *Conclusion*

1. Remember, the lecture should not be over-used. It can be extremely interesting, informative and entertaining, but you have to work at it. Give life to your lectures with examples and incidents instead of dry facts and statistics. Keep all lectures very short. Use them only as portions of your lessons. People learn best by "doing".

10

The discussion method

1001/ *Introduction*

1. The discussion method is one in which the students and the instructor exchange their ideas in order to get a better understanding of a topic. It can be a whole period or part of a lesson. It requires careful planning and control (See Annex A).

1002/ *Steps in a formal discussion*

1. There are four distinct steps in a formal discussion:
 - a. *Introduction*. It remains the same as for the other methods of presentation. Aim, Motivation, Outline and Link all appear.
 - b. *Short Talk by Leader*. Here the leader gives some background on the subject, which is normally a review of previous experience or provides information for the group.
 - c. *Discussion*. The interchange of ideas and opinions of the group. This should be as free and spontaneous as possible.
 - d. *Summary*. Sums up the ideas and findings of the group. It ties up the parcel.

1003/ *Uses and advantages of the discussion method*

1. The discussion method has some excellent uses and advantages from an instructor's point of view. For example, it:
 - a. creates interest
 - b. stimulates thinking
 - c. improves powers of association
 - d. points out gaps in learning
 - e. points out instructional gaps
 - f. reveals attitudes
 - g. improves power of expression

- h. widens a person's understanding – a good link between theory and practice
- i. uses group's experience.

1004/ *Limitations of the discussion method*

1. The discussion may be limited by the:
 - a. size of the group
 - b. time available
 - c. knowledge of the group

1005/ *Suggestions to leader*

1. The instructor who observes the following suggestions will be a more effective discussion leader:
 - a. Start on time.
 - b. Questioning technique – redirect questions to the group as much as possible.
 - c. Coverage – depends on time available. Limited as compared to lecture method.
 - d. Control – keep your students on the subject while attempting to involve all in discussion.
 - e. Stop on time. It is better to leave a group desiring more than to bore them.

1006/ *Conclusion*

1. Although limited to small groups with some background knowledge, this method can be used in many situations and is excellent for follow-up. Remember, don't use this method if the group has nothing to add and is not knowledgeable in the field. A pooling of ignorance nets nothing.

*Preparation for and conduct of a group discussion**Part 1 – Preparation*

1. *Make an outline.*
 - a. Determine the discussion objectives.
 - b. Prepare a detailed outline of discussion topics and points to be covered.
2. *Determine who should attend.* Select only those people who are directly concerned with the subject or problem.
3. *Have materials ready.*
 - a. Necessary materials to be discussed.
 - b. Charts and diagrams to be displayed.
 - c. Necessary materials for note-taking.
4. *Arrange time and place of discussion.*
 - a. Select a time that is most convenient for everyone.
 - b. Select a room which is quiet and where everyone will be comfortable. Have enough chairs, tables, ash trays, and adequate light and heat.

Part 2 – Conduct

1. *Open the discussion.*
 - a. Introductory remarks – put the group at ease.
 - b. State the purpose of the meeting.
 - c. Review the background for the meeting.
 - d. State the problem or topic to be discussed.
2. *Present the subject.* The subject may be presented in any one of the following ways:
 - a. State the important points.
 - b. Ask questions.
 - c. State an opinion.
3. *Conduct the discussion.*
 - a. Encourage participation – mutual exchange of experiences; give everyone a chance to take part.
 - b. Control discussion – avoid personal feelings resulting in arguments; prevent anyone from monopolizing the discussion.

- c. Keep the discussion on the topic.
 - d. Summarize frequently – analyze the progress of the discussion.
4. *Summarize the discussion.* Indicate the highlights, the conclusions reached, and actions to be taken.

11

The developmental method

1101/ *Introduction*

1. The developmental method of instruction is one where the instructor develops the lesson step-by-step, (usually on the chalkboard) by asking thought-provoking questions. "Two-way traffic" does result but this method is more rigidly controlled than the discussion method.

1102/ *How to use the developmental method*

1. The success of the developmental method depends on very thorough preparation and carefully worded questions properly asked.
 - a. *Preparation.*
 - i Know the subject thoroughly.
 - ii Know the background of the group.
 - iii Prepare a plan with a notation of the points to be obtained from the students.
 - b. *Introduction.* State the aim, motive, outline and link.
NOTE – this is particularly important if the students are to build up the lesson themselves.
 - c. *Presentation.*
 - i Ask the group reasoning questions to get them to discover points for themselves.
 - ii Write key points on the chalkboard (or insert them in the diagram if the class is developing a circuit or a piece of equipment).
 - iii Tell the members points they cannot be expected to reason out.
 - iv Don't persist in asking individuals who obviously don't know the answer. This may entail asking half a dozen people before the correct answer is finally obtained.
 - v Don't allow call-out answers.

1103/ *When to use the developmental method*

1. Apply it when the group members have sufficient background to enable them to discover further points for themselves under the guidance of the instructor.

1104/ *Conclusion*

1. The developmental method is a good method of instruction because it ensures that students take part in the session. Progress is geared to their ability. Remember, when people themselves reason out points, the material sticks.

12

Oral questions

1201/ *Introduction*

1. People learn most when they are mentally active. Properly used questions stimulate mental activity because they:
 - a. *provoke thought*. Often students can reason out points without help from the instructor.
 - b. *gain attention*. Keep students' minds on matter under discussion.
 - c. *arouse interest*. The instructor should not expect a group to sit back, just listen, and be interested for 50 minutes.
 - d. *direct the thoughts of the class*. "Warm up" students in the introduction by asking questions.
 - e. *discover individual and group weaknesses*. Questions enable the instructor to discover how much has been absorbed and what has been omitted from the lesson.
 - f. *give the student the next best thing to practical experience*. If the instructor poses interesting problems, he mentally takes the group from the classroom to an actual situation.

1202/ *When to use questions*

1. The instructor should use questions throughout a lesson:
 - a. *in the Introduction*. He can review knowledge already gained and which is to be utilized later on.
 - b. *in the Presentation*. He can review a step and get the students to reason the next one. Questions can be used here to check progress and maintain interest.
 - c. *in the Application*. He can test and summarize. Give the students a chance to ask their own questions.

1203/ *Characteristics of good questions*

1. All good questions arouse interest. They must therefore be:
 - a. *clearly enunciated*. An answer cannot be expected if the question has not been heard.
 - b. *to the point*. There must be no doubt as to what is being asked.
 - c. *brief*. If the question is protracted, its point will be lost.
 - d. *within the student's vocabulary*. If a term is not understood, neither is the question.
 - e. *challenging*. Questions which are too easy bore the group.
 - f. *designed to elicit the desired answer*. General or tangential questions can bring correct answers without making the point required.
 - g. *stimulating*. They must encourage thought.

1204/ *Poor questions*

1. Avoid questions which demand:
 - a. *obvious answers*. They irritate.
 - b. *"yes" or "no" answers*. Unless followed immediately by a request for explanation.
 - c. *lengthy explanations*. It is better to break up your questions to obtain shorter answers.

1205/ *Methods of asking*

1. The following questioning technique has proven most effective:
 - a. Address the question to the group.
 - b. Use the phrasing: question – (pause) – name. For example, "What is the colour of the high tension lead———(pause)———Smith?"
 - c. Forbid "call-out" answers.
 - d. Insist on complete and clearly enunciated answers.
 - e. Ask for replies from various parts of the class.
 - f. Do not waste too much time obtaining an answer from a student.

1206/ *Conclusion*

1. Questions are an invaluable method of provoking learning.

The student must know what the instructor is after, and the answer required must demand the use of reasoning. The question should be posed to the entire class and, after a pause, one individual selected to give an answer.

13

Qualities of norm and criterion reference examinations

1301/ *Introduction*

1. This chapter is concerned with the difference between norm-reference and criterion-reference examinations, and the traditional characteristics of good examinations.

Part 1 – Norm and criterion reference examinations

1302/ *Norm-reference examinations*

1. A norm-reference examination is designed to measure and compare the capability of one student against the capabilities of others. For example, a specified achievement test is designed to establish his position – low, average, or high – in relation to others who took the test.

1303/ *Criterion-reference examinations*

1. A criterion-reference examination is designed to ascertain a student's status with respect to some established criterion or standard. For example, a student pilot must meet certain standards in taking off or landing an aircraft. The quality of his performance is compared not so much with the performance of others but judged against rigid standards which he must achieve.
2. The purpose of performance-oriented training is not to differentiate among the students but to raise each student's performance to the level specified as acceptable by the objectives. The main purpose of a criterion-reference test is to determine when the individual student has reached an acceptable level of performance.

1304/ *Use of criterion-reference examinations*

1. Along with the demands to clearly identify training requirements and to set specific performance objectives, there has been a growing demand to develop criterion-reference examinations which can be used at various points in the training program.
2. It is becoming increasingly popular to administer tests to confirm whether the student has the background knowledge and skills which are considered necessary for a particular course. For instance, a student who is weak in arithmetic should not be permitted to enrol in an algebra course, and a student who lacks a knowledge of algebra should not be admitted to a physics course until he has the pre-requisites for it.
3. Pre-tests are administered to determine to what degree a student already meets the criteria of a course. If he possesses the knowledge and skills which the course is designed to impart, then there are arguments for crediting him with the course and allowing him to use the time saved to acquire new knowledge and skills. If he meets only some of the criteria, then ideally the course should be flexible enough to provide him only with the specific training which he requires.
4. Many instructors use short tests before, during, or at the conclusion of a unit of training to determine a student's areas of strength and weakness and so permit him to concentrate on the latter; to obtain feedback on the student's progress; to establish the student's mastery of the contents of a lesson or unit; and to determine the student's readiness to proceed to related or advanced work.
5. Tests are normally administered at the end of a course to predict the student's ability to transfer his knowledge and skills to on-the-job situations and to predict his performance in related or more advanced courses.
6. A criterion-reference test is a quality control instrument which, in addition to measuring a student's performance, evaluates an instructor's performance – his success or failure in attaining specified goals. An instructor is now, more than ever, accountable.

Part 2 – Characteristics of a good examination

1305/ *Traditional characteristics*

1. It has always been emphasized that a good examination – oral, written, or performance – should be:
 - a. valid
 - b. reliable
 - c. objective
 - d. discriminating
 - e. comprehensive
 - f. easy to administer and mark.
2. A good norm-reference examination will possess these characteristics, but a criterion-reference examination need not possess all of them.

1306/ *Validity*

1. The validity of an examination is the extent to which it actually tests what it is designed to test.
2. Validity depends upon the degree of similarity between the method of examining and the performance under measurement.

EXAMPLE

Are one's marks on a written examination in baseball a valid measure of ability to play the game well?

Obviously if ability is measured, a practical test is more valid than a written examination.

3. If a final examination following a long course contains very few questions, and if these questions deal with relatively unimportant matters, the examination is not valid.
4. An examination designed to measure what a tradesman has learned in a specific training program should measure his achievement in that training program and nothing else. Marks lack validity if the examination has been so constructed that a highly intelligent student can work out the answers whether or not he knows the subject matter involved. Other factors which often affect the validity of examination marks are legibility of writing, writing skill, vocabulary, student estimation of material that is likely to be on the examination, and ability to memorize facts rather than apply them.

5. Suggested methods of obtaining valid examinations and consequent valid scores are:
 - a. Have several competent individuals assess the content of the examination to determine whether or not it covers the subject taught and reflects the criteria established for the course.
 - b. Compare examination results with other measures of the student's achievement.
 - c. Try the examination on tradesmen of proven and known ability.
 - d. Follow up to ensure that on-the-job training is adequate and that job-related training is effective.
 - e. Average the scores of several valid examinations to obtain a better measure of a student's achievement.
6. Norm-reference and criterion-reference examinations must be validated. It should be easier to validate the latter because what is to be measured has already been clearly indicated by the performance objectives specified in each unit of the training program. Examination items must be constructed to match these objectives.

1307/ *Reliability*

1. The reliability of an examination is its ability to measure achievement accurately and consistently.
2. If the examination measures exactly to the same degree each time it is administered, and if the factors that affect the examination scores affect them to the same extent each time the examination is given, the examination is said to be high in reliability. A highly reliable examination, therefore, should yield essentially the same score when administered twice to the same student provided that no learning or forgetting occurs between tests.
3. An examination may not measure what it claims to measure – that is to say, its validity may be low, but it may be accurate in measuring what it really does measure – that is to say, its reliability is high.
4. Well constructed questions must lend themselves to one, and only one, interpretation by students. Instructions on examinations should be clear and to the point.
5. The reliability of an examination may be improved by

increasing its length. More questions provide a greater coverage of the material taught. The fewer the chances of guessing the correct answer to each question, the greater the reliability. Clear and concise directions also increase the reliability of an examination.

6. Various statistical procedures have been developed to measure the reliability of a norm-reference examination which is designed to provide a spread of marks. However, a criterion-reference examination, administered at the end of a course, might provide a very narrow spread of marks or no spread at all. For example, every student might achieve a specified minimum objective, or in some cases, every student might obtain a required 100%.

1308/ *Objectivity*

1. Objectivity in an examination requires that the personal opinion of the marker does not affect the mark.
2. An examination should be such that several people can score it and arrive at the same mark. The personal opinion of examiners as to the value of answers, standards, etc., cannot interfere. In other words, the more objective the examination, the greater is its reliability.
3. It is well recognized that the essay-type examination, as usually constructed and marked, is not satisfactory. Examiners rarely agree on the marks to be given because they rarely have a common, objective basis for marking.
4. If higher marks than usual are being obtained on an essay-type examination, the markers have a tendency to mark harder. Tests have been conducted with qualified instructors marking the same paper at various times and a wide range of marks has been obtained. This does not mean, however, that the essay-type examination should be done away with altogether because it has its advantages over other methods and is adaptable to certain subjects. Norm-reference and criterion-reference examinations, however, should be designed to produce a uniform mark when scored by several examiners.

1309/ *Discrimination*

1. Norm-reference examinations are used to make decisions

about students and to establish their relative positions. To do this, easy, average and difficult items are developed to ensure a spread of marks. The discriminating power of a norm-reference examination is increased by a detailed analysis of each item after the examination has been scored. Non-discriminating items are usually those which are too easy, too difficult, and/or too ambiguous.

2. Criterion-reference examinations are used to determine whether a student has or has not met established standards. The items are discriminating insofar as they identify those who achieve performance objectives and those who do not. If, however, certain items are creating difficulties for the students, the items should be analyzed to determine whether they or the instruction is at fault.

1310/ *Comprehensiveness*

1. A norm-reference examination must sample liberally all phases of relevant instruction. It is not always possible to cover every point in the course, but a sufficient number should be selected to provide a valid measure of the student's achievement.
2. A criterion-reference examination is designed to establish whether a student has or has not met all, established criteria of the course.

1311/ *Ease of administration and marking*

1. If time is critical or if there are few qualified examiners available, examinations should be designed for easy administration and quick scoring. If he/she decides to use a written examination, the instructor has the choice of an essay examination or an objective examination. Each has its advantages and disadvantages as noted in the following comparison:

ESSAY EXAMINATION

Sometimes a valid measure of complete understanding of the few points covered.

OBJECTIVE EXAMINATION

More comprehensive – covers many points, provides a better measure of factual knowledge.

Better measure of ability to organize and express thoughts but attaches much importance to the ability to write.

Evaluates knowledge.

Requires more time to write and score.

Difficult to score objectively.

Does not measure ability to organize and express thoughts.

Evaluates knowledge if there is a large number and variety of questions.

May be long or short, but can be rapidly scored with a key or may even be machine scored.

Scoring is more reliable; more accurate.

14

Written examinations

Part 1 – True-False

1401/ *Description*

1. The true-false examination consists of a number of statements that are either true or false. The student is required to indicate whether or not each statement is true by writing in the word "true" or "false", "yes" or "no", or by the letters "T" or "F". This type has been used for achievement tests. *For certain limited purposes*, true-false tests have value.

1402/ *Uses, advantages and limitations*

1. The instructor should carefully develop his examination. It is a valuable document not only for him/her but for others who may use it as a basis for their testing.
 - a. The true-false examination can be used most effectively as a class quiz in testing lecture knowledge or as a progress test. It will promote interest and class discussion, and will determine whether a class has been absorbing lecture material.
 - b. As it is composed of a large number of questions, it can be used to test a class on wide ranges of subject matter.
 - c. It can be scored readily even by a person who knows nothing about the subject.
 - d. The questions can be worded in such a manner that the students must reason to determine whether the answer is true or false.
 - e. *It has doubtful value as an instrument for measuring achievement, particularly as guessing affects the score. The score obtained may be higher than a true measure of achievement.*

- f. It is sometimes difficult to construct questions that are either completely true or false without making the correct response obvious.
- g. A test of this type must include a large number of questions giving good coverage to the material.

1403/ *Construction of true-false examinations*

1. The construction of a good true-false examination is time-consuming.
 - a. The first step is to write a series of true statements covering the material to be tested. Each statement is to cover one important point and contain only one thought.
 - b. Do not make one part of a statement true and the other part false.
 - c. Do not make the true statements consistently longer than the false statements or vice versa. Do not follow a fixed pattern in your sequence of true and false items.
 - d. Do not make the statements false simply by using a negative, and do not let the grammatical construction of the statement give a clue to the fact that it is false.
 - e. Avoid topics of a controversial nature.
 - f. Avoid words that give clues. For example, because the words "always", "never", "all", "none", "invariably", etc., are usually used in false statements, they give the student the idea that the statement is false.
2. There are many variations and modifications of the true-false examination. These modifications have much greater testing value than the plain true-false item and compare favourably with other types. Modified true-false items may be designed to require the student merely to mark the items that are true and "modify" the false items by: (1) crossing out the word that makes the statement false, or (2) identifying the word that makes the statement false and listing another word that would make it true. Still another modification has the student choose the correct word from a list of words given. Another variation requires the student to give the reason for his answer. The variations and modified forms should be substituted for the plain true-false item whenever possible. The construction of these forms requires much skill and practice.

1404/ *Scoring*

1. Since it is theoretically possible to obtain a score of 50% merely by guessing, it is necessary to use a formula in scoring which will compensate for guessing. The simplest formula is:

$S = R - W$. Disregard omitted items. Subtract the number of Wrong answers from the number of Right answers. "S" represents the final Score or mark.

Note: If formula scoring is used, the student should be advised of this, and counselled not to guess.

Part 2 – Multiple choice

1405/ *Description*

1. The multiple-choice question usually consists of an incomplete statement followed by several words, phrases, or clauses from which the student must select the one that will complete the statement.

1406/ *Value*

1. The multiple-choice item in its various forms is one of the most valuable that can be incorporated in a written test. Some of the various forms of this test follow:

1407/ *One right answer*

1. This is the simplest form of multiple-choice item. The student is required to identify the one correct response listed among several that are wrong but not obviously so.

1408/ *Best answer*

1. This variation requires the student to select the correct answer or best response from a series of possible responses. This is the most valuable of the several forms of the multiple-choice in current use as it requires judgment on the part of the student to select the best response. A great deal of teaching is done with the specific purpose of getting students to the point where they can form judgments, draw conclusions, make close discriminations and arrive at decisions. Multiple-choice examinations measure these abilities.

1409/ *Variations*

1. The best-answer multiple-choice may be varied to require the student to:
 - a. select the best two responses from a series of possible answers
 - b. indicate the worst response or the least desirable solution
 - c. indicate both the best and worst responses.

1410/ *Reverse multiple choice*

1. The reverse multiple-choice question differs from other forms in that the student is required to choose the poorest or wrong response from among several correct responses. Specific directions must be given for the reverse multiple-choice type.

1411/ *Uses, advantages and limitations*

1. Multiple-choice examinations are very popular, but instructors should be aware of their disadvantages as well as their advantages.
 - a. The multiple-choice question is highly objective.
 - b. It can be scored quickly by anyone using a key.
 - c. It can be constructed so as to give extensive sampling of knowledge and to suit many kinds of subject matter.
 - d. The effect of guessing is not serious.
 - e. The construction of the test requires much time.
 - f. It measures retention by the "recognition method" which is not so exacting as the method of "recall".
 - g. There is a danger of including more than one response which can be marked as correct.
 - h. Incorrect responses are often obviously incorrect.
 - i. Multiple-choice questions can be designed to measure the student's ability to form judgments and apply things learned, though considerable ingenuity is required to construct them for this purpose.

1412/ *Construction of multiple-choice items*

1. Multiple-choice items can be very difficult to devise.
 - a. To prepare complete questions, write out a series of statements to cover the material on each course topic

taught. Complete each item by preparing at least four responses.

b. Do not include any responses that are obviously wrong, because an intelligent student can answer such a question by a process of elimination.

c. It takes quite a bit of ingenuity to write incorrect answers so that they seem correct. Part of the secret is to avoid leaving "clues", as for example:

i denoting the correct answer by making it longer than the others.

ii narrowing the choice down because one or two answers are not even on the same subject matter, or not even plausible.

iii giving grammatical clues; for example, mixed singulars and plurals, changes in parts of speech, etc. Including "a" or "an" as the final word before listing the answers is a clue as to what should follow.

d. Vary the location of the correct answer in the list of choices, thus avoiding a fixed pattern.

e. To make this an excellent test and one that discriminates, all possible responses must be worded in such a manner that the student must know the subject matter in order to select the correct response.

Part 3 – Matching

1413/ *Description*

1. The matching type of test includes two lists or columns of related things such as words, phrases, clauses, or symbols. The student is required to match each item in one list with the most closely related item in the other list.

1414/ *Uses, advantages and limitations*

1.
 - a. The student's ability to recognize relationships and make associations can be tested readily with the matching test.
 - b. The matching test may require the student to match:
 - i terms or words with their definitions
 - ii characteristics with the mechanical units to which they apply
 - iii short questions with their answers

- iv symbols with their proper names
 - v descriptive phrases with other phrases
 - vi causes with effects
 - vii principles with situations in which the principles apply
 - viii parts or mechanical units with their proper names
 - ix parts with the unit to which they belong.
- c. A large number of responses can be presented in a small space and with one set of directions.
 - d. The test can be made totally objective.
 - e. The test tends to be highly reliable and discriminating.
 - f. Since the phrases or clauses must necessarily be short, the matching exercise provides a poor measure of complete understanding and interpretation.
 - g. It is inferior to the multiple-choice question in measuring judgments and application.
 - h. It is likely to contain, by elimination, clues to the correct response.

1415/ *Construction of matching items*

1. There are some general points to observe when constructing matching items:
 - a. Require the student to make at least five and not more than 12 responses in completing each matching exercise.
 - b. Include at least three extra terms in the list from which responses must be chosen. This tends to reduce the possibility of guessing or answering by a process of elimination.
 - c. Only homogeneous or related materials should be included in any one exercise.
 - d. Place the column containing the longer phrases or clauses on the left hand side of the page.
 - e. In matching the parts of the item, each part should be used only once.
 - f. In setting up the test make sure that all of a given matching exercise appears on one page.
 - g. Make the directions specific. State in the directions or in the heading the area of instruction to which the things listed apply.

Part 4 – Completion

1416/ *Description*

1. The simple completion type of question requires the student to recall and supply one or more key words that have been omitted from statements. The words, when inserted in the appropriate blanks, make the statements complete, meaningful and true. The statements may be isolated and more or less unrelated, or they may be combined to form short paragraphs that carry a continuous line of thought.

1417/ *Uses, advantages and limitations*

1. The instructor who plans to use completion questions should be aware of the following points:
 - a. The simple completion question can be used to test the student's ability to recall specific facts; it demands accurate information.
 - b. It can sometimes be used effectively to sample a wide range of subject matter.
 - c. The paragraph form can be used to test continuous thought along a certain line.
 - d. The completion question has high discriminating value.
 - e. The simplest way of answering completion questions is to write missing words in blank spaces.
 - f. It is difficult to make entirely objective, Elicit the precise words expected.
 - g. Used indiscriminately, it tends to measure verbal facility and memorization of facts rather than application.

1418/ *Construction of completion items*

1. Some care must be taken in constructing completion items:
 - a. Omit no more than two words in a given sentence. Leaving too many blanks makes it necessary for students to memorize entire statements. A short statement with only one word omitted is preferable.
 - b. Place the blanks near the end or at least past the centre of the sentence. This makes for continuity when reading the statement.

- c. Design each statement in such a manner that it will remain incomplete until the correct response is inserted.
- d. Omit only key words. Make sure that the *knowledge* it is intended to test is omitted rather than some insignificant or trivial word.
- e. Do not copy statements directly from text books to make a completion item.
- f. It is poor practice to omit verbs.
- g. If possible, construct the question so that there can be only one correct response.
- h. If synonyms are to be accepted, include them in the scoring key.
- i. Make blanks of the same length.

Part 5 – Short answer

1419/ *Description*

1. A short answer item is a direct question for which there is a single, short response. (The answer may be in several distinct parts: a, b, c, etc.) It is of the "recall" rather than "recognition" type. It is one of the best objective tests for measuring knowledge.

1420/ *Uses, advantages and limitations*

1. The short answer question is popular for a number of reasons:
 - a. It is easy to prepare and can be used for a wide variety of subject matter.
 - b. It tests the ability to recall, which is a more exacting requirement than the ability to recognize the right answer.
 - c. Its simplicity of form makes it easy to understand what is required.
 - d. Its scoring is fairly objective, though not completely so because there may be a suitable answer other than the one in the instructor's key.
 - e. It may be used to require a student to state fully a basic principle, e.g., Ohm's Law.

1421/ *Construction of short answer items*

1. Short answer questions are relatively easy to construct and can be easily scored:

- a. Write statements to cover the material being tested.
- b. Re-write each statement in the form of a question that can be answered in a word, or a phrase, or a sentence.
- c. Ensure that there is only one correct answer for each question. (If there is a possibility of more than one, centre it around a single idea.)
- d. Construct the test so that the space for the answer is always near the right hand side of the test paper.
- e. In scoring the test, care should be taken to see that satisfactory alternative answers to those placed in the key are given due consideration.

Part 6 – Essay

1422/ *Description*

1. In the essay-type question, the student is required to make a comparison, write a description, or explain certain points on which instruction has been given. Although it has been criticized severely, it can be designed to provide an effective measurement of certain important outcomes of instruction.

1423/ *Uses, advantages and limitations*

1. The essay-type question has advantages and serious disadvantages:
 - a. It can be used effectively to measure the student's ability to organize and express thoughts.
 - b. It can be used to measure complete understanding of certain points.
 - c. Its greatest disadvantage lies in the fact that its scoring becomes subjective.
 - d. Answering the essay question requires much student time. Scoring the question requires much more time than required for other types.
 - e. Only a relatively small number of points can be covered by the essay question in a given test. A poor sampling of the subject matter results.
 - f. It provides an opportunity to "bluff".

1424/ *Construction of essay items*

1. The subjectivity of essay questions can be reduced if the following points are observed:
 - a. Call for specific things. Word the question in such a manner as to provide the student with an outline that he/she can follow in formulating his response.
 - b. State the question in a simple, direct manner.
 - c. Allow one mark for each significant point expected in the answer and then assign the question an appropriate value. This will allow a student to properly allocate his/her time.
 - d. Design the essay question to require the student to compare, explain why, give a reason, describe, or explain how, rather than to name, list, or enumerate. The latter type of question has, of course, its place.
 - e. It is in scoring the essay type test that great difficulty is experienced. Every effort must be made to keep the scoring as objective as possible. The following points should be observed to ensure maximum objectivity:
 - i Write out the answer expected for each question. Include every point that is to be accepted.
 - ii Score one essay question on all the test papers before proceeding to the next.
 - iii Give value to a question by allowing one mark for each point covered in the answer.
 - iv Conceal the students' names on the papers or in some manner make sure that their identity is not revealed. This is particularly important when instructors have opportunity to become personally acquainted with students.

Part 7 – Administering written examinations

1425. *Examiners' responsibilities*

1. Some suggestions for administering written examinations are attached as Annex A to this chapter. More detail is available in "Modular Examination Development", a manual produced by the Manpower Training Branch, which also contains much valuable information on examination plans and construction of various types of examination items.

Some suggestions for conducting examinations

1. Standardization of examination conditions is important – that is, the way in which directions are given, the length of time allowed for the examination, etc. Regulations should be laid down and adhered to.
2. Content of examinations should not be changed without approval of the examining authority.
3. Verbal instructions should be precise.
4. Adopt a pleasant, encouraging manner. This puts candidates at ease and gives them confidence.
5. Question papers must be safeguarded. Keep them in a safe place and collect every copy of each examination.
6. Seating arrangements are especially important in conducting objective examinations. Place candidates well apart and have sufficient supervisors present.
7. Where space is a problem it is desirable to have alternate forms of the same examination designated as, say, “X” and “Z”. The content of the two forms is the same, but the order of the questions or of the items within a question is different in the two forms. By alternating these examination forms among the candidates, it becomes difficult for an individual to see his neighbour's answers.

15

Item analysis (small groups)

1501/ *Introduction*

1. Although an instructor may believe that his testing duties are completed with the preparation, administration, scoring and grading of a test, this is not so. The real and lasting benefits are derived from an analysis of the test.

1502/ *Advantages*

1. An analysis of objective tests has several values:
 - a. It serves as a basis for test improvement by indicating questions which should be scrutinized for deletion or amendment.
 - b. It serves to compile examinations of a uniform standard.
2. Objective tests can be analyzed with reasonable speed and accuracy, and results can be recorded either on the basis of individual test items or test scores. The school or section can build up cumulative, permanent records that serve as a basis for improvement of both teaching and testing.

1503/ *Steps*

1. The analysis of test items involves the following steps:
 - a. Score the test.
 - b. Arrange the papers according to score from high to low.
 - c. Divide the examination papers into two equal groups; one upper group, one lower group based on scores obtained. If the total number of examinations is odd, discard the middle one.
 - d. Calculate the *Ease Value* of each item.

$$\frac{i \text{ UG} + \text{LG}}{\text{TOTAL}} \times \frac{100}{1}$$

UG represents the number in the Upper Group giving the correct response; LG represents the number in the Lower Group giving the correct response; and TOTAL represents the number of students writing the item.

Example:

In a class of 20 students, if two in the Upper Group chose the correct answer for a question and one in the Lower Group chose the correct answer, then the Ease Value of the item is:

$$\frac{2 + 1}{20} \times 100 = 15\%$$

The higher the percentage, the easier the item.

- ii Check those items answered correctly by all students (Ease Value of 100%) and those items answered incorrectly by all students (Ease Value of 0%). These items must be reworded if they are to be used again or omitted because they do not discriminate.
- iii Examine those items whose average Ease Value is 95% or greater. Unless they are basic, they may be regarded as being easy and do not add to the discrimination of the examination. Similarly, all items whose average Ease Value is 10% or less may be considered difficult and lacking in general discrimination.
- iv Examine the other items in which the correct percentage falls between the two extremes and when revising the test, place the easiest items first and the hardest items last.
- v Record the value.

e. Calculate the *Discriminatory Index* of each item:

i The Discriminatory Index of an item is:

$$\frac{UG - LG}{1/2 \text{ TOTAL}} \times \frac{100}{1}$$

Example:

If six in the Upper Group chose the correct answer for a question and two in the Lower Group chose the correct answer, then the Discriminatory Index (or measure of spread) is:

$$\frac{6 - 2}{1/2 \times 20} \times 100 = 40\%$$

ii A discriminatory Index of 10% or greater is considered to be satisfactory.

1504/ *Precautions*

1. For purposes of analysis a small group is one which contains between 10 and 29 students. When analyzing examination results it is necessary to adopt the special method – upper and lower 50% method – described. No method of analysis can be applied to groups of fewer than 10 students except that, for between six and nine students, a complete breakdown of responses (all papers combined) may prove of some value to the instructor.

16

Performance Tests

1601/ *Purposes*

1. A performance test measures how well a student can perform a given task. The student is required to make, service, repair, operate, shape, assemble, or disassemble something. The student is checked on his speed and accuracy. The purposes of performance tests, many of which are closely related, include the measurement of:
 - a. skill and information
 - b. ability to apply knowledge
 - c. ability to solve problems
 - d. aptitude for training.

1602/ *Construction*

1. Detailed planning is required in the construction of a performance test.
 - a. Examine the course of study to determine what portions of it should be tested.
 - b. List the necessary tools and equipment.
 - c. Prepare directions for the students, stating the exact purpose of the test and operations to be performed.
 - d. Prepare directions for the examiner to follow while administering the test.
 - e. Try out the test on a few students or the other instructors and make necessary changes.

1603/ *Administration and scoring*

1. Thorough preparation and qualified observers are required to administer and score performance tests objectively.
 - a. Where needed, have on hand appropriate measuring instruments such as micrometers, gauges, rulers, templates, etc.

- b. Have a competent observer judge a student's performance using the check list of specific points as a guide.
- c. After a student has completed the test, evaluate his/her understanding of the job by questions on the proper procedures, principles, reasons for the various steps, and expected results of the operations or procedures.
- d. Assign an appropriate grade based on the quality of a student's performance and his/her understanding of the operations.
- e. Determine accurate standards of workmanship and performance before giving the test. (If necessary, provide examples of the different degrees of excellence of the finished job.)
- f. Make a check list of specific points involved in the task.

1604/ *Advantages*

1. Two major advantages of performance tests are:
 - a. A performance test is the most direct means of finding out whether a man can actually do a job and do it well. Written tests, no matter how carefully or cleverly constructed, may fail in this respect. For example, a student may pass a written test on how to reline brakes, answer all the questions asked, and yet commit several errors while actually carrying out the task.
 - b. Performance tests reveal, better than any other test, specific difficulties a student encounters when doing a job. In a situation where the student is required to service, repair, shape, assemble, or disassemble something, a performance test is practically the only way of revealing whether the student:
 - i handles his tools efficiently
 - ii observes all necessary safety precautions so as not to endanger himself or his fellow workers
 - iii carries out the operations in the correct order or sequence
 - iv becomes unduly frustrated when unable to do any part of the job
 - v fails to care for his tools properly.

1605/ *Limitations*

1. The disadvantages of performance tests are the *limitations* imposed by outside circumstances. The assistance of experienced personnel in the test section can be used in overcoming some of the following:
 - a. They are difficult to set up properly.
 - b. They are more difficult to administer than written tests because they often require tools and special equipment.
 - c. Much of the instructor's or assistant instructor's time is required in checking student performance.
 - d. Wherever the performance is of a detailed and precise nature necessitating close observation, an assistant instructor is able to watch only one student at a time. In large classes such performance tests would be clearly out of the question. Oral questioning or written tests which attempt to get at performance indirectly would have to be substituted.

1606/ *Example*

1. An example of a performance test is attached as Annex A. The test is used in an Army service school and requires the student to wire and time an "in line" gasoline engine. It consists of three parts: directions to the student, directions to the checker or observer (an assistant instructor), and a check list for recording the results of a student's performance. An especially valuable feature of this test is the simplicity and clearness of the directions. They leave no doubt as to what the student or the checker is to do.

*Performance test**WIRING AND TIMING AN "IN LINE" GASOLINE ENGINE**Part 1 – Directions to the student*

1. This test is designed to measure your ability to wire and time an "in line" gasoline engine using methods taught in class. Necessary tools and equipment will be furnished. The test consists of two parts.
2. PART ONE is worth 5 points and requires you to wire and time an engine. If you complete the task within 15 minutes, you earn a maximum of 5 points on this part of the test. One point will be deducted from the maximum of 5 points for every 5 minutes you spend over 15 minutes in solving the problem. You will be asked to stop work if you are not through with the task in 35 minutes. The following table shows the points you can earn in relation to the time spent:

Within 15 minutes	— 5 points
15 to 20 minutes	— 4 points
20 to 25 minutes	— 3 points
25 to 30 minutes	— 2 points
30 to 35 minutes	— 1 point
over 35 minutes	— 0 point
3. PART TWO is worth 10 points. Points are earned if you:
 - a. observe safety precautions while wiring and timing the engine
 - b. are accurate in wiring and timing the engine
 - c. use tools correctly and safely
 - d. take proper care of tools and equipment.
4. Report to the "chief-of-shift" as directed by the instructor and secure the performance test check list. He will designate on the check list the time, the assistant instructor who will check your work, and the number of the engine on which you will work.
5. Report directly to the assistant instructor and give him the check list. Begin work as soon as possible. Remember,

ANNEX A
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the time started is the time you leave the desk of the "chief-of-shift" and the time completed is the time you return to his desk. Any time you waste getting started gives you that much less time to complete the test.

6. When you have wired and timed the engine, get your check list from the assistant instructor and take it to the "chief-of-shift". He will record the time completed and determine your final grade. The assistant instructor has observed and checked your work and graded PART TWO of the test.
7. Return to your engine and help the assistant instructor tear it down to prepare it for the next student.

Part 2 – Directions to the assistant instructor or checker

1. Read very thoroughly the directions given for taking the test. Be sure you understand the test and the method of marking before attempting to give it to the student.
2. Put the student to work as soon as possible. His "time started" on the test begins when he leaves the desk of the "chief-of-shift".
3. Observe and check the student very carefully on the items in PART TWO of the test.
4. When the student has completed the test, add the points earned in PART TWO of the test and record them in the proper space at the bottom of the check list.
5. Have the student return to the "chief-of-shift" to have the time completed recorded and his final grade totaled.
6. The student has been instructed to return and assist you in preparing the engine for the next student.
7. *The attached check list is to be used in evaluating student performance.*

WIRING AND TIMING AN "IN LINE" GASOLINE ENGINE

Student _____ Section _____ Date _____
Engine number _____ Assistant instructor _____

PART ONE (5 points): Time required to wire and time the engine.

Time started _____ Time completed _____

SCHEDULE OF TIME AND POINTS EARNED

Within 15 minutes	—5 points	25 to 30 minutes	—2 points
15 to 20 minutes	—4 points	30 to 35 minutes	—1 point
20 to 25 minutes	—3 points	Over 35 minutes	—0 point

(Student to stop test if not completed in 35 minutes)

Points earned by the student

(Circle one)

5 4 3 2 1 0

PART TWO (10 points): Check student on each point.
Circle the 1 (one) after the item if the answer is YES
and 0 (Zero) if the answer is No.

A. CHECK WHILE STUDENT IS
TAKING THE TEST.

YES NO

1.	Battery ground cable disconnected until wiring completed.	1	0
2.	Grounded battery terminal tested for spark before connecting to battery cable clamp.	1	0
3.	Engine starts the first time.	1	0
4.	Student careful not to race the engine	1	0

B. CHECK AFTER STUDENT HAS COMPLETED
THE TEST

YES NO

5.	Ammeter wired correctly.	1	0
6.	Proper firing order at distributor and spark plugs.	1	0
7.	Generator and control unit wired together correctly.	1	0
8.	Ignition switch wired into circuit.	1	0
9.	All tools used correctly and safely.	1	0
10.	All tools and equipment cared for properly	1	0

Points earned in PART ONE-----
Points earned in PART TWO-----
FINAL GRADE (possible 15)-----

17

Some principles of learning

1701/ *Teaching and learning*

1. Learning without teaching is possible. Teaching without the accompaniment of learning is also possible! The range between teaching of the highest and lowest quality is broad.

1702/ *Definition of learning*

1. Learning can be defined in many ways, but a commonly accepted definition is that learning, along with being knowledge or skill acquired through instruction and/or study, includes modification of behavior as a result of experience.

1703/ *Kinds of learning*

1. There are three kinds of learning:
 - a. *Emotional* – learning through thought and feeling. (respect, open mindedness, hate, prejudice, fear of snakes).
 - b. *Sensory* – learning through the senses. (textures, morse code, colour).
 - c. *Motor* – learning of a skill (swimming, typing, skating).

1704/ *Methods of learning*

1. There are three methods of learning:
 - a. *Trial and Error*. Sometimes this is called "Trial and Accidental Success". It is the most common method of learning. The best that can be said of it is that the learning is thorough. But the method is time-consuming and error may be retained. A certain degree of trial and error learning appears in both the other methods discussed below.

b. *Learning by Guidance.* This is trial and error tempered by guidance. In other words, the student makes use of the instructor's experience and thus economizes time. In this, humans usually differ from other animals. Seldom does one cow teach another to stay away from the electric fence. (Your present seminar is, hopefully, an example of Learning by Guidance.)

c. *Learning by Analysis.* Through combining various past experiences, the student works out a solution to a new problem. Sometimes the student seems to reach the solution through steps of which he is not fully conscious.

1705/ *Principles of learning*

1. The principles of learning mentioned below are simple; yet if we omit one of them from a lesson when it is needed, much of the effectiveness of the lesson may be lost.
 - a. *Primacy.* "Teach it right the first time". It is very difficult to "unlearn" faulty ideas. (A plea for PREPARATION.)
 - b. *Readiness.* "Is the student ready for this lesson?" We must first be sure that the student knows enough to go on with this lesson. Next we must convince him that he needs this lesson. (A plea for LINK, OUTLINE and MOTIVATION at the start of the lesson.)
 - c. *Intensity.* "The more intense (vivid) the lesson, the greater the learning". This principle is the reason we use films, charts, illustrations, humour, and illustrative anecdotes. The instructor's personality is also involved. (A plea for TRAINING AIDS.)
 - d. *Belonging.* "Things are more easily learned if the learners see how they apply to them." Students must see how today's lesson fits into the overall learning scheme (piece of jig-saw puzzle). (A plea for OUTLINE and LINK.)
 - e. *Effect.* "Learning is strengthened if satisfaction results and may be weakened if attended by annoyance". "If we like it, we'll learn it" (hobbies). Further, if a student does not know how well he/she is progressing, learning is hindered. (A plea for MOTIVATION throughout the lesson and the course.)
 - f. *Exercise.* "Practice makes perfect". Learning may be reinforced by supplementing the lesson with films,

reference works, and exercises. A skill cannot be learned without ample practice periods. (A plea for APPLICATION.)
 g. *Recency*. "Other things being equal, the strength of learning depends upon the recency of practice". The closer to a learning situation, the greater the immediate retention. In other words the student tends to remember best that which he hears, sees or does last. (A plea for SUMMARY.)

1706/ *Learning graphs and curves*

1. If units of practice are plotted in relation to units of return, the interpretation of the resulting graph or curve can prove most valuable. They usually take the form of:
 - a. *Straight Line*. Each unit of practice brings an equal increase in return. (Fig. 1)
 - b. *Increasing Returns*. More practice brings forth greater return. (Fig.2). This stage cannot last indefinitely but will lead to:
 - c. *Decreasing Returns*. More practice brings less or nil return. (Fig.3)

LEARNING CURVES

FIG. 1



FIG. 2



FIG. 3



1707/ *The plateau*

1. All instructors and many students are familiar with the situation in which additional units of practice produce no significant increase in returns. It is not easy to find out the causes. Some are:
 - a. monotony experienced on a long course
 - b. lack of recreation
 - c. unwarranted self-confidence

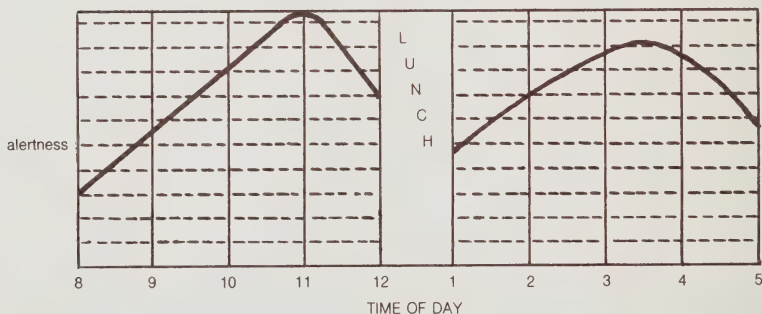
- d. final climax of a personality clash between an instructor and a group
 - e. other psychological factors (e.g. a feeling that some member of the class has been unfairly treated)
 - f. either too fast or too slow a pace
 - g. a general decline in motivation.
- The problem here is to find the real cause; once diagnosis is correctly made, the remedy may be obvious, even though not easy.

1708/ *Learning curve for the day*

1. The time of day at which any one of us reaches his/her energy peak varies widely. Experiments in schools and industry, however, have demonstrated that most of us are never so dull as at 8 a.m. We are never so bright as around 11 a.m. After lunch, we slump again (but not to the 8 a.m. level). We rise again between 3 and 4 p.m. (but not so high as at 11 a.m.); we slump again toward 5 p.m. (but not so badly as at 8 a.m. or 1 p.m.). (Fig. 4)

LEARNING CURVES FOR THE DAY

FIG. 4



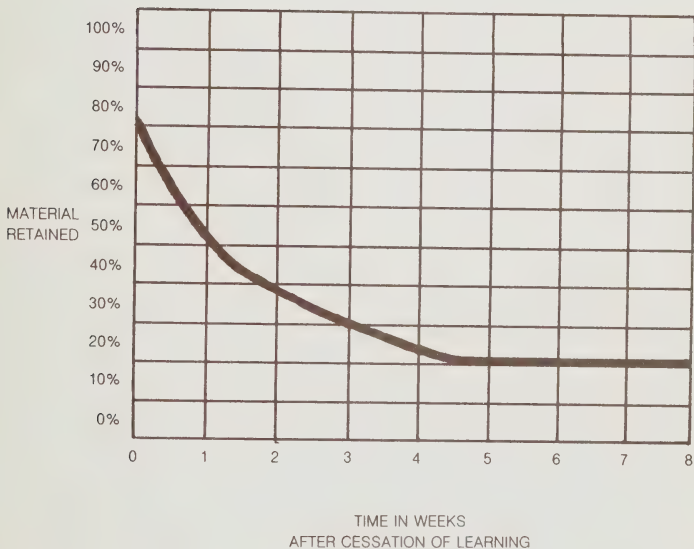
2. Put difficult material at peak times; put interesting material at low times; put easy material just after lunch. (Don't schedule films right after lunch.) Counteract late Friday afternoon slump by either interesting material or a test.

1709/ Retention

1. Retention is the amount of learning sustained at any stated time after the cessation of practice – or what we remember after we have completed study.
2. An analysis of a curve of retention reveals the following:
 - a. We forget material much more quickly right after the lesson, than later on. We may be consoled by the fact that we have probably not forgotten any more geometry in the last five years than in the year immediately after we finished studying that subject.
 - b. If students are not going to remember more than 23% of a given lesson after eight weeks, make sure that what they do retain is the important material. (Another plea for the SUMMARY in your lesson).

CURVE OF RETENTION

FIG. 5



18

Student concentration

1801/ *Introduction*

1. Unless students concentrate on what the instructor is trying to teach them, they will not learn very much. This concentration is largely dependent upon how much "figure" teaching the instructor is able to manage. A knowledge of this "figure" idea helps us deal with the problem of student concentration.

1802/ *The figure-ground concept*

1. Sometimes "Figure-Ground" thinking is called "Foreground-Background" thinking. For example, if you are concentrating on the information in this precis at this very moment, then the content of what you are reading is "Figure" in your mind. In addition, your mind has stored vast amounts of experience and knowledge. This "experience" is not being used right now but may be said to be lying dormant in the "background" waiting to be summoned when needed. While it lies in this state it is called "Ground". "Ground" can replace "Figure"; e.g., if you are at present thinking about tomorrow's meeting, then your concentration is not centered on this paragraph. What should be "Figure" has become "Ground" and what should have remained "Ground" has become "Figure". This shift in concentration can easily and quickly take place in a student's thinking. Therefore, an instructor must sustain what he is teaching as a strong "Figure" in the minds of his students.

1803/ *Figure vs ground*

1. It was once thought that there was a sharp dividing line between being awake and being asleep. It is now felt that

there is no sharp dividing line and that there are many degrees of both. Being asleep might be termed being in low "Ground". Generally, people are not so awake at 8 a.m. as at 11 a.m.; at night, they sleep lightly or deeply. While asleep, they are conscious in some low-ground way of the edge of the bed – or they would be constantly falling to the floor.

1804/ *Precision of figure*

1. How precise and strong does this "Figure" become?
 - a. *High Figure to Low Ground*. If everything that is "Figure" in the mind does not slip into "Ground", one cannot fall asleep.
 - b. *Low Ground to High Figure*. A person is asleep. A mosquito enters the room and buzzes around. The opening of the eyes might be the first reaction; the pulling of the blankets over the head, the second. The person is gradually emerging from a state of deep "Ground" into more sharply defined "Figure". Can you imagine the final High-Figure state – the individual running about the room, newspaper in hand, lights blazing, in pursuit...? Sleep has gone.
 - c. *When Need is Very Strong*. An individual will set a new world's running record at the Olympics, but it is suggested that better records are established in pastures enclosing mad bulls. In a crisis, need is very strong and reactions are powerful. When a father knows his baby daughter is trapped in a burning building, he "learns" to take appropriate action very quickly.

The moral is, of course, that the higher and more precise the "Figure", the greater is the learning.

1805/ *Interchange of figure and ground*

1. If what should be "Ground" becomes "Figure", difficulty may arise:
 - a. *Example*. The threat of a situation where one is presenting one's case before a superior, may result in a disjointed, rather than a logical approach. Stage fright is another example of "ground" (in this case "Fear") becoming "Figure".

b. *Example.* While being introduced to an individual, you miss his name because you are concentrating on, "What impression am I making on him?"

Keep first things first. Attention to the proper "Figure" will help learning. Keep your students' minds on the proper "Figure".

1806/ *How to achieve figure teaching*

1. It is easier to achieve "Figure" teaching if we know that people respond to things going on about them in terms of two variables:
 - a. *Experience.* A civilized man sees a missionary coming down the road and looks upon him with respect; a cannibal sees the same missionary and looks upon him as something to eat. Each man responds in terms of his personal experience.
 - b. *Need.* A man, room-hunting in Toronto, is driving around the city. He reads a "No Right Turn" road sign as "No Rooms to Rent" because his need is uppermost in his mind. He gets into difficulty with the law because his response was affected by his need.An instructor must teach in terms of the experience and needs of his students.

1807/ *Application*

1. Wise instructors make what they are teaching "Figure" in the minds of students. They may do this, by using training aids, illustrative stories, humour, drama, etc., and by appreciation of the following points:
 - a. People respond in terms of their experience and needs.
 - b. Instructors will teach effectively if they find out something about the experience and needs of their students.
 - c. Teaching is effective when instructors plan their lessons in terms of these experiences and needs.
 - d. A good link effectively uses student experience.
 - e. Good motivation effectively arouses student need.

1808/ *Summary*

1. The more you make students feel the need for learning,

and the more you are able to present the work in terms of their personal experience, the stronger will be your "Figure" teaching. The stronger the "Figure", the greater the concentration. The greater the concentration, the greater the learning on the part of the student – which is the main aim of the instructor.

19

Study hints

1901/ *Introduction*

1. Many students do not know how to study properly. The instructor can assist individuals to develop personal study plans, but should acquaint all students with the principles of effective study.

1902/ *Memory*

1. We know from experience and from experiment that our memories are not always reliable. A deliberate effort must be made to absorb and retain data. There must be "intent to remember".

1903/ *Tools*

1. A student should learn to make effective use of the study materials available. There are advantages in owning books and precis which can be annotated. When studying, students can underline points which they consider important and when reviewing, can save time by concentrating on those points. They should also take careful notes during their reading or listening.

1904/ *Note taking*

1. Good notes are an invaluable study tool and there are proven techniques for organizing and taking them:
 - a. Review the material or copy the instructor's outline.
 - b. Use a separate book or a separate section of a loose-leaf book for each subject.
 - c. Leave the left page blank. This can be used later for adding further ideas. Provide a 2" margin for comments and references.
 - d. Use your own words – not those of the instructor or the

author. You have not mastered an idea until you can express it in your own words.

1905/ *When to study*

1. Most successful students set aside a period every day for study, e.g., 8–9 a.m. or 9–11 p.m. They prepare for new work, and review material which has been presented. By studying regularly they avoid the panic of a crash study program before examinations.
2. Concentrated study can be hard work and it is necessary to take short breaks. One suggested method is to study fifty minutes, then rest for ten. Another is to relax when there is a natural “break” in the material, for example, at the end of a chapter or on completion of a subject review.

1906/ *Where to study*

1. Research indicates that the best study places are those which are quiet and distraction-free. It is easier to concentrate facing a wall than facing a window overlooking a busy area.

1907/ *How to study*

1. Here are a few tips on study techniques:
 - a. Attack the hardest subject in the first half of the study period.
 - b. Begin with the easiest work within that subject.
 - c. Use a pencil to underline important points. (Use the pencil sparingly).
 - d. Use the “Survey Q3R” method:
 - i “Survey” or obtain a general picture of the work; e.g., read paragraph headings.
 - ii “Question” – Turn paragraph headings into questions.
 - iii “Read” to answer the questions.
 - iv “Recite” or test yourself by repeating the important points.
 - v “Review” or quickly re-read the material covered.

1908/ *Conclusion*

1. Your students will already have been exposed to these principles in school. One important technique you can teach them is the use of the "Survey Q3R" method.

20

Human relations (case studies)

2001/ *Dealing with students*

1. The supervisor/instructor probably does more to make or break a training program than any other individual. Consider the following:

A visitor asked permission to speak to the newest man in each of two training units. After introducing himself, the visitor asked this simple question, "How do you like the training you are receiving?" Here's what the two men had to say!

John (Group A): "How do I like it? Well, I've been here over two weeks and you're the first person who's asked me anything about it. My leader started me off the first day and showed me how to run this machine okay, but I haven't really talked to him much since. He introduced me to my foreman, but I didn't catch his name; he's that short, gray-haired guy over there. Between you and me, I'm hoping to quit this training bit. Can't seem to get to know the fellows around here. This place may be okay for the old boys, but it's no place for a new guy."

Carl (Group B): "When I came here I was jumpy; instructors have always made me nervous and I've always hated them. They always pushed me around to show me who was boss, but I don't feel that way now. The first day I was here, Mr. Simpson, my instructor, talked to me about myself and even my kids. I was slow catching on and I expected to be bawled out when I started on this machine. But he said he'd started on this same kind of machine and that I was turning out better work on it than he did when he started. How could a guy hate a situation when he has a boss like that?"

2002/ *Other cases for study and discussion*

1. *John didn't know*

John Bowers had worked fifteen years as a draftsman in a small engineering firm in Detroit. About two years ago he took a job in the Engineering Branch of Maintenance with another firm. John was a conscientious worker and took a great deal of pride in his work. He was always willing to help the other draftsmen when work piled up. Some of them took advantage of his good nature and he found himself doing quite a bit of extra work.

Several times during his two years' service at the new location, special projects were given to him but he was passed over for promotion. Promotions were made in the shop several times. Each time John was overlooked.

Finally, he decided to quit. When he went to his supervisor, the supervisor said, "John, we can't let you go, we need you here. Why you're the best draftsman we have."

He persuaded John to think it over for a couple of days. That night, John told his wife, "When I worked at my old job in Detroit, I knew that the boss thought my work was good. But today is the first time since I've come to work at the new place that my supervisor has said anything about my work."

Mary's first job

Mary Small took her first job as a typist. She was assigned to a typing pool. As soon as she reported for work, she was given the job of typing a number of personnel forms. Being unfamiliar with personnel terms, she made a number of errors. When she came to work the third morning, her supervisor informed her that the other girls would finish the forms. Mary was given a job of assembling and stapling papers. After a week of stapling, she began to worry about whether she would be given another chance to prove her typing ability. She felt depressed about the mistakes she had made and began to doubt her ability to do the work she was hired to do.

Dale is resented

Dale Furman was transferred to the Administrative Section of Personnel in a reduction-in-staff move. It happened that he "bumped" one of the most popular workers in that section. Unconsciously, the other members of the section resented Dale's presence. They talked to him when their work required it, but generally excluded him from the informal contacts that occur in most offices. After this had gone on for some weeks, Dale went to his supervisor. He said that certain individuals in the office were picking on him and were deliberately making his job harder.

2003/ *Improving relationships*

1. Annex A and Annex B to this chapter provide some tips for creating a better rapport between instructor and students. The instructor is a leader, and will be a much more effective one if he/she recognizes individuality and treats each student in a fair, firm and friendly fashion.

Some techniques of good human relations

1. Let all students know where they stand. Periodically discuss evaluations.
2. Give credit when credit is due; give praise for accomplishments.
3. Inform them in advance of changes. Informed people are more effective.
4. Let them participate in plans and decisions affecting them. Participation encourages cooperation.
5. Gain their confidence. Earn loyalty and trust.
6. Know all your students personally. Find out their interests, habits, and touchy points. Capitalize on your knowledge of them.
7. Listen to their ideas. They have good ideas, too.
8. If a student's behaviour is unusual, find out why. There's always a reason.
9. Try to make your wishes known by suggestions or requests whenever possible. People generally do not like to be pushed.
10. Explain the why of things that are to be done. People do a better job when they know why.
11. When you make a mistake, admit it. Others will resent you blaming someone else.
12. Show the importance of every job.
13. Criticize constructively. Give reasons for criticisms and suggest ways to improve performance.
14. Precede criticisms with good points. Show you are trying to help.
15. The supervisor sets the style. Do as you would have them do.
16. Be consistent in your actions. Let them know what is expected.
17. Show confidence in your students. This will bring out the best in them.
18. Set proper goals. Give your students goals they can work for.
19. If one person gripes, find out why. The gripe of one may be the gripe of many.

20. Settle all grievances, if possible. The unsettled grievance of one person affects everyone.
21. Back up your people. Authority must accompany responsibility.

Are you an effective leader?

1. Do you create fear – or confidence? (Bossism breeds resentment – leadership breeds enthusiasm.)
2. Bossism says “I” – a leader says “we”.
3. Bossism fixes blame – a leader fixes mistakes.
4. Bossism knows how – a leader shows how.
5. Bossism makes work drudgery – leadership makes work interesting.
6. Bossism relies on authority – a leader relies on co-operation.
7. Bossism drives – a leader leads.

21

Glossary of manpower training terms

ACCREDITATION

Recognition of an individual's qualifications in a particular area because of the skills and/or knowledge which he has demonstrated.

APPRENTICESHIP

A systematic program of on-the-job and related classroom training designed to produce a fully qualified journeyman tradesman. An employer undertakes by contract, written or implied, to employ and personally train an individual as an apprentice or ensures that he is trained under the supervision of a qualified journeyman.

APPRENTICESHIP CREDITS

Time credits for secondary and manpower post-secondary achievements, academic and/or vocational, as determined by the Director of the Manpower Training Branch. These credits are expressed in hours per apprenticeship period and, as such, reduce the length of apprenticeship.

APTITUDE

Ability to acquire relatively general or special types of knowledge or skill; tests to determine such ability are called aptitude tests.

ASSESSMENT OF TRAINING EFFECTIVENESS

A general term for the processes of ascertaining whether training is efficient or effective. It covers both validation and evaluation.

ATTITUDE/KNOWLEDGE/SKILL PATTERN

The essential determinants of effective job performance (i.e., behaviour) in terms of attitude, knowledge and skills – the attitude to perform, the knowledge required to approach the task properly and the skills necessary to do it.

BASIC TRAINING

The first stage of training for a given job, occupation or group of occupations, aimed at imparting the fundamental attitude/knowledge/skill pattern to required standards. This can be further developed by subsequent training and experience. It may

be given in training centres, schools or colleges, or in special training workshops or training bays in organizations. In some cases it may have to be given in the production situation, but training and not production is the primary objective.

BASIC TRAINING

For the purpose of government assistance with manpower training for firms in development areas, the period which a trainee of average ability, with no previous experience in the firm's processes, takes to acquire the basic skills and knowledge required for the job and to be able to contribute to production without close and continual supervision.

BEHAVIOURAL OBJECTIVES

A clear description of the actual responses required of a trainee at the end of a course of instruction. The statement of training objectives in behavioural terms should be a prerequisite of the design of any course. They also describe the conditions under which the behaviour is to take place and specify the minimum acceptable criteria, standards or tolerance.

BLOCK RELEASE

A system whereby employers allow their employees to attend community colleges for short periods of full-time study, usually of several weeks' duration, each year. The amount of time available for study may be a little more than that provided under day release arrangements, and in some cases falls only a little short of that provided on a sandwich course.

CERTIFICATE OF APPRENTICESHIP

A numbered certificate issued to a trainee who has complied with the Apprenticeship and Tradesmen's Qualification Act, 1964 and the regulations of his trade. In non-certified trades a certificate of apprenticeship indicates successful completion of training.

CERTIFICATE OF QUALIFICATION

A numbered certificate issued to an individual who has complied with the Apprenticeship and Tradesmen's Qualification Act, 1964, and the regulations of his certified trade. The certificate of qualification is also issued to those from outside Canada who satisfy the Director of the Manpower Training Branch that they have obtained the necessary experience, knowledge and skill in their trade.

COLLEGES OF APPLIED ARTS AND TECHNOLOGY (CAATS)

CAATs provide general and specialized post-secondary courses not offered by universities.

The basic purpose of the CAATs in Ontario is to provide education beyond high school (general, vocational, occupational and technical) at low cost, and to make it as accessible to as many youths and adults as possible.

CRAFTSMAN

A skilled worker in a particular occupation, trade or craft who is able to apply a wide range of skills and a high degree of knowledge to basically non-repetitive work with a minimum of direction and supervision. He is skilled as a result of practical training (usually under apprenticeship), which is normally combined with an appropriate course of technical education.

CRITERION BEHAVIOUR

A detailed specification of what the student is expected to be able to do at the end of the program. It should specify the questions he/she should be able to answer; the tasks, procedures, techniques and skills that he/she is expected to perform, and to what level they are to be executed; what discriminations it is reasonable to expect the student to make and in what terms these discriminations can be expressed; what total changes in behaviour are to be expected; in what form they can be observed and their intensity measured. The term may also be applied to other training methods. See also "Criterion test."

CRITERION TEST

A test, in the appropriate written or practical form, designed to measure terminal behaviour and thereby discover to what degree the student/trainee demonstrates the criterion behaviour. It can also be given as a pre-test to identify individuals who need the training, and/or a post-test to measure the effectiveness of the program by comparing the pre-test and post-test scores.

CURRICULUM

The word curriculum is sometimes used as a synonym for syllabus. It is a statement of the subject matter or content of a training course. It may indicate the time to be devoted to each part of the training but not usually the order in which the items should be learned nor the methods of instruction to be used.

Another definition is that a curriculum is an educational program, formally or informally organized.

DAY RELEASE

The system by which employers allow employees to absent themselves from work without loss of pay for the purpose of

attending a course of further education. Day release courses are arranged by community colleges in association with local industry and provide part-time education, usually for one day a week.

EDUCATION

Activities which aim at developing the knowledge, moral values and understanding required in all walks of life rather than knowledge and skill relating to only a limited field of activity. The purpose of education is to provide the conditions essential for young persons and adults to develop an understanding of the traditions and ideas influencing the society in which they live, of their own and other cultures and of the laws of nature, and to acquire linguistic and other skills which are basic to communication and learning.

ELEMENT (OF WORK)

A distinct part of a specified task selected for convenience of observation, measurement and analysis.

EVALUATION

The measurement of the total value of a training course or program in social as well as financial terms. Evaluation differs from validation in that it attempts to measure the overall cost benefit of the course or program and not just the achievement of its laid-down objectives. See also "Validation."

FEED-BACK/KNOWLEDGE OF RESULTS

The process by which information about the results of an action are communicated to the trainee. As this enables him to modify his immediate and subsequent actions to achieve more closely his set objectives, it is a concept of fundamental importance to training. The science of cybernetics is concerned with this process in machine control systems as well as in humans.

FORMAL TRAINING

Training that is provided in an establishment designed or designated specifically for training and staffed for that purpose. It includes basic training given in specially equipped workshops; simulated training; and any periods spent under formal training conditions during the later stages of apprenticeship.

IDENTIFICATION OF TRAINING NEEDS

An examination of the organization's present and expected operations and the manpower necessary to carry them out in order to identify the numbers and categories needing training or retraining. It may also refer to the training need of an individual to enable him to reach the required standard of performance.

INDUCTION (ORIENTATION)

Arrangements made by the employer to familiarize the trainee/new employee with the industry, the firm, welfare and safety matters, general conditions of employment and the work of the department in which he/she is to be employed. It is a continuous process starting from the first contact with the employer. The length of the program will vary according to the level of entry, the sophistication of the job and previous experience.

IN-SCHOOL TRAINING

Training in the attitude/knowledge/skill pattern required for a task, job, or occupation away from the normal work situation. It is normally only part of the whole training program and is usually combined with on-the-job training.

JOB

All the tasks carried out by a particular worker in the completion of his prescribed duties. In a wider context the term also covers the social and physical environment in which it is carried out. See also "Element (of work)," "Task" and "Occupation."

JOB ANALYSIS

The process of examining a job in order to identify its component parts and the circumstances in which it is performed. The detail and approach may vary according to the purpose for which the job is being analyzed, e.g., vocational guidance, personnel selection, training, equipment design.

JOB DESCRIPTION

A broad statement of the purpose, scope, duties and responsibilities of a particular job.

JOB REQUIREMENTS

The characteristics required of the worker to perform the job successfully, e.g., adequate colour vision would be an essential job requirement for a job involving colour discrimination.

JOB SPECIFICATION

A product of job analysis – a detailed statement of the physical and mental activities involved in the job and, when relevant, of social and physical environmental matters. The specification is usually expressed in terms of behaviour – i.e., what the worker does, what knowledge he uses in doing it, the judgments he makes and the factors he takes into account when making them.

JOURNEYMAN

Normally, a tradesman who has successfully completed his apprenticeship training.

MODULE

From a comprehensive job analysis, skills and knowledge components are identified, and those which are closely related in content are grouped to form a "block" or "module."

MODULAR TRAINING

A type of training based on the concept of building up skills and knowledge in units as needed by the individual. Each module is based on a skill or group of skills which analysis shows to be a viable unit in the job situation and has a training element, an experience element and, where appropriate, a further education element. The satisfactory completion of a series of modules usually denotes a recognized level of qualification and the satisfactory completion of further modules may lead to a higher level of qualification. The duration of a module varies according to its content.

OCCUPATION

A collection of jobs which are sufficiently similar with regard to their main tasks to be grouped together under a common title, for the purpose of identification and classification. See "Element (of work)."

OCCUPATIONAL ANALYSIS

The process of examining in detail all available evidence, including job descriptions and specifications concerning jobs, in order to identify those that are sufficiently similar with regard to their main tasks to be grouped together under a common occupation-title. When the analysis is completed an occupation description can be produced.

ON-THE-JOB TRAINING

Training given in the normal work situation in the attitude/knowledge/skill pattern appropriate to a task or job. It may constitute the whole of the training or be combined with off-the-job training and /or further education.

PERFORMANCE STANDARD

Frequently defined as a minimum acceptable standard. See also "Criterion behaviour."

POST-TEST

A test given after a training program to ascertain whether the desired standard has been attained and with the pre-test to measure the effectiveness of the program. See also "Criterion test."

PRE-APPRENTICESHIP COURSE

Course mainly of technical and general education, but including a proportion of craft practice. Satisfactory completion of a full-time course (which is sometimes offered in a secondary school or community college) often gains the student exemption from a part of his apprenticeship.

In industry, a broad appreciation of the occupation or occupations given individuals prior to entering an apprenticeship is often combined with a probationary period.

PRE-TEST

A test given before a training program to confirm that the student has the prior knowledge assumed to be necessary by the compilers of the program, or when used in the sense of a criterion test, to discover to what degree the student is already able to meet the detailed specifications of the criterion behaviour.

PROBATIONARY PERIOD

A conditional period of training or of work in employment, intended for testing the validity of occupational choice. It may also be used as a diagnostic period. See also "Pre-apprenticeship course.

PROGRAM EVALUATION

See "Evaluation."

REFRESHER TRAINING

Training given to revise and refresh previously learned skills and knowledge, which have become "rusty" through disuse, of. updating training, booster training.

RETRAINING

Training for the acquisition of the attitude/knowledge/skill pattern required in an occupation other than one for which the trainee was prepared originally or in some cases for a new job or part of a job. This training is often given in the form of accelerated vocational training but other training methods may be appropriate.

SANDWICH COURSE

A course of alternate periods of study in a post-secondary institution and of associated industrial, professional or commercial experience, so organized that frequently several months of each year of the course are spent in the post-secondary institution.

SECONDARY SCHOOL CREDITS

Successful completion of an Ontario secondary school course of 110 to 120 hours of scheduled time. These credits are considered when assessing an individual's qualifications for entry into apprenticeship training.

SECONDARY SCHOOL GRADE LEVEL EQUIVALENTS

Prior to 1972-73 the following grades with their credit equivalents were:

Grade 9	7 credits	Grade 12	27 credits
Grade 10	14 credits	Grade 13	33 credits
Grade 11	21 credits		

SECONDARY SCHOOL GRADUATION DIPLOMA

A diploma granted on the recommendation of the principal of an Ontario secondary school to a student who satisfactorily completes a minimum of 27 credits.

SIMULATED TRAINING

The training provided in artificial conditions, reproducing those of a work situation, where formal training instruction can be followed and opportunity given for practising and applying skills learned in workshop or classroom. It will include work on plant and equipment removed from the work situation for training purposes and/or on specially designed simulators.

SKILL

An organized and co-ordinated pattern of mental and/or physical activity in relation to an object or other display of information, usually involving both receptor and effector processes. It is built up gradually in the course of repeated training or other experience. It is serial, each part from second to second is dependent on the last and influences the next. Skills may be described as perceptual, motor, manual, intellectual, social, etc., according to the context or the most important aspect of the skill pattern.

TASK

A major element of work or a combination of elements of work by means of which a specific result is achieved. See also "Element (of work)," "Job," and "Occupation."

TASK ANALYSIS

A systematic analysis of the behaviour required to carry out a task with a view to identifying areas of difficulty and the appropriate training techniques and learning aids necessary for successful instruction.

TASK DESCRIPTION

A statement of the activities to be performed in carrying out a given task in terms of, e.g., perceptions, discriminations and decisions to be made, and techniques and procedures to be followed. These and other requirements may be set against a time scale.

TERMINAL BEHAVIOUR

The actual behaviour registered by the student at the end of the training program. The difference between this and the criterion behaviour is a measure of the effectiveness of the training program.

TEST

A standardized type of written or practical examination given to a group or individual; it may be qualitative or quantitative, i.e., determine presence or absence of a particular capacity, knowledge, or skill, or determine the degree to which such is present. In the latter case, the degree may be determined by the relative position of an individual in the group or the whole population, or by assigning a definite numerical value in terms of some selected unit. See also "Criterion test."

TRADE

An occupation which usually requires a period of apprenticeship as part of the learning process.

TRADE RELATED SUBJECTS

Subjects of a technical or vocational nature, knowledge of which is considered necessary for more effective job performance. See also "Colleges of Applied Arts and Technology."

TRADESMAN

See "Craftsman."

TRAINING

The systematic development of the attitude/knowledge/skill pattern required by an individual in order to perform adequately a given task or job. It is also described as the systematic development of prescribed criterion behaviour. See also "Criterion behaviour."

TRAINING COURSE

A series of sessions linked to deal with a well-defined section of a training program/scheme with specific, clearly stated aims and objectives. See also "Curriculum."

TRAINING ENVIRONMENT

The physical and psychological surroundings in which training takes place. It involves all the objects, forces and conditions that affect the individual.

TRAINING FUNCTION

All that has to be done in meeting the training responsibilities of an organization. The four main steps are: identification of training needs in terms of jobs and people; formulation of training policy for the consideration of management; implementation of the

training process, using the most appropriate systems, methods and aids; and assessment of training effectiveness.

TRAINING MATRIX

A pattern or arrangement of modules which reflects the basis of the training program and graphically reveals the relationship of the modules.

TRAINING SPECIFICATION

A detailed statement of what a trainee needs to learn based on a comparison between the job specification and his present level of competence.

UPGRADING

Training for supplementary knowledge and skill in order to increase the versatility and occupational mobility of a worker. It is sometimes referred to as "supplementary training" and may include the acquisition of skill in a related trade or occupation. The term is also used in its original sense of moving a worker up in grade within the general framework of a trade or occupation, e.g., a worker being trained to a higher level of skilled work by a rotation system through the entire job range required at the higher level.

VALIDATION (OF A TRAINING PROGRAM)

A series of control tests carried out on the subjects of the training program designed to ascertain whether it has achieved its aim, i.e., been successful in teaching what it set out to teach (internal validation), and, judged on the basis of its effectiveness measured against specific yardsticks (such as improvement in quality or quantity of production or reduction in accidents), whether the aim itself was realistically based on training needs (external validation). See also "Evaluation."

